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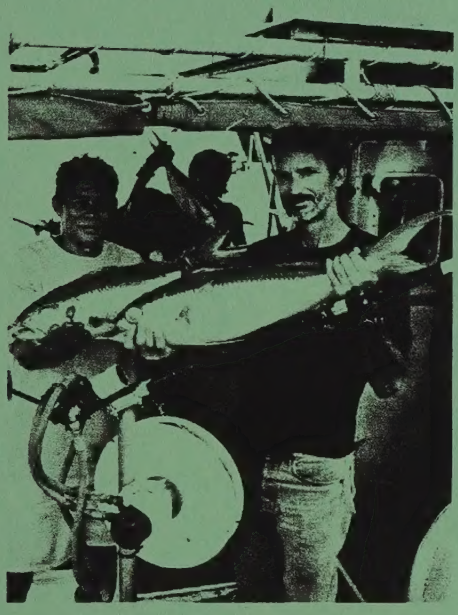
2000 Annual Report



May 2002

Western Pacific Regional
Fishery Management Council
1164 Bishop Street, Suite 1400
Honolulu, Hawaii 96813

Cover photo: Northwestern Hawaiian Islands limited entry Ho'omalu zone permit holder (Robert Gomes right) and crew display onaga caught aboard the F/V Kealailani.

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Bottomfish and Seamount Groundfish Fisheries of the Western Pacific Region

2000 Annual Report

March 2002

Prepared by the Bottomfish Plan Team and Council Staff

for the

Western Pacific Regional Fishery Management Council
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Bottomfish and Seamount Groundfish Fisheries of the Western Pacific

2000 Annual Report

1.0 INTRODUCTION

The 2000 annual report provides a set of descriptors and indicators of the bottomfish fisheries from American Samoa, Guam, Hawaii and the Northern Mariana Islands. The descriptors are designed to document recent trends in landings, effort, participation, revenue and prices. Should management action be recommended, descriptor information will aid in assessing potential impacts of the action on fishery participants. The indicators are quantifiable and measurable tools used to identify signs of stress in the stocks or the fishery. Based on changes over time in indicator levels, the Bottomfish Plan Team (BPT) may identify "yellow light" situations (i.e., where stress is first detected) and recommend that either management action or additional study be undertaken or "red light" situations where immediate management action is needed.

The annual report is organized as follows: The introduction section defines and briefly explains the descriptors and indicators. The next section briefly summarizes time trends in descriptor and indicator levels, through the current year, and recommends any areas of concern for each island area. Reports from each island area are appended. The introduction describes the history and present characteristics of the fishery. Results of the current year's descriptors and indicators are presented in detail, in relation to past temporal trends. Figures are supported with information on source of the data, methods of calculation, and data interpretation. Table 1 summarizes 2000 bottomfish statistics for the region. The appended report from each area includes a summary of the new area specific and region-wide recommendations. Finally, additional appendices contain information on NMFS 2000 administrative and enforcement activities, habitat conditions, protected species interactions, and 2000 BPT membership.

Table 2 lists scientific, common English and local/indigenous names for bottomfish management unit species (BMUS) for each area (American Samoa, Guam/Northern Marianas, and Hawaii).

1.1 Definition of Descriptors

The fishery descriptors are defined as follows:

1.1.1 Landings information

Time series information on aggregate catch for each island area shows recent trends in total bottomfish harvest. For American Samoa and Guam, estimates of both the commercial landings and the total landings (combined commercial, recreational and subsistence) are available. For Hawaii and the Northern Marianas, landings information represents only the commercial harvest.

Table 1. Regional Summary of 2000 Bottomfish Species

				Hawaii			
	AS	GU	NMI	All	MHI	Mau	Hoomalu
BMUS Landings (lb)	27949	66151	33343	740424	478424	49000	213000
Revenue ($)	53416	80947	103477	2728000	1858000	160000	710000
No. Of Boats	17	312	64	---	480	7	6
No. Of Trips	241	7159	632	---	3544	36	47
CPUE	10.2 lb/hr	3.7 lb/hr	58 lb/trip	---	196 lb/trip	1,053 lb/trip	5,255 lb/trip
SPR	---	---	---	0.27-0.52	note 1	note 2	note 2

Notes:

1) Species with Spawning Potential Ratio near or below threshold level of 0.20, indicating localized subarea depletion: MHI onaga ("targeted" SPR = 0.07); MHI ehu ("targeted" SPR = 0.08); MHI hapuupuu ("best/worst" SPR = 0.25)
2) Healthy (SPR > 0.20) for all species (Mau Zone=0.42, Hoomalu Zone=0.68)

Table 2. Bottomfish Management Unit Species (BMUS) Names

(Absence of an indigenous name implies no local name established or area is not within the species' geographic range.)

Scientific	English Common	American Samoa	Guam/CNMI	Hawaii
Bottomfish:				
Aphareus rutilans	red snapper/silvermouth	palu-gutusiliva	maraap tatoong	lehi
Aprion virescens	gray snapper/jobfish	asoama	tosan	uku
Caranx ignobilis	giant trevally/jack	sapoanae	tarakito	white ulua/pau'u
C. lugubris	black trevally/jack	tafauli	trankiton attilong	black ulua
Epinephelus fasciatus	blacktip grouper	fausi	gadao matai	
E. quernus	sea bass			hapu'upuu
Etelis carbunculus	red snapper	palu-malau	guihan boninas	ehu
E. coruscans	red snapper	palu-loa	onaga	onaga
Lethrinus amboinensis	ambon emperor	filoa-gutumumu	mafuti/lililok	
L. rubrioperculatus	redgill emperor	filoa-pa'o'omumu	mafuti tatdong	
Lutjanus kasmira	blueline snapper	savane	sas/funai	ta'ape
Pristipomoides auricilla	yellowtail snapper	palu-i'usama	guihan boninas	yellowtail kalekale
P. filamentosus	pink snapper	palu-'ena'ena	guihan boninas	opakapaka
P. flavipinnis	yelloweye snapper	palu-sina	guihan boninas	yelloweye opakapaka
P. seiboldi	pink snapper		guihan boninas	kalekale
P. zonatus	snapper	palu-sega	guihan boninas/gindai	gindai
Pseudocaranx dentex	thicklip trevally		terakito	butaguchi/pig ulua
Seriola dumerili	amberjack		guihan tatdong	kahala
Variola louti	lunartail grouper	papa	bueli	
Seamount Groundfish:				
Beryx splendens	alfonsin			kinmedai (Japanese)
Hyperoglyphe japonica	ratfish/butterfish			medai (Jap.)
Pseudopentaceros richardsoni	armorhead			kusakari tsubodai (Jap.)

In Hawaii, changes in species catch composition are provided for the Main Hawaiian Islands (MHI) and the Northwestern Hawaiian Islands (NWHI). Statistical tests for consistency in catch composition over time and between areas are included. Where possible, descriptor information has been presented for each NWHI management zone: Hoomalu and Mau. For 2000, pounds landed by species are presented in tabular form for each area except Hawaii. For Hawaii, NWHI BMUS landings by species are provided for 1986 through 2000.

1.1.2 Effort information

Effort is measured in number of trips for Hawaii and the Northern Marianas, and in both hours fished and trips taken for American Samoa and Guam.

1.1.3 Participation information

Estimates of the number of vessels making bottomfish landings are provided for all areas.

1.1.4 Economic information

Time trends in economic performance are characterized by plots of total ex-vessel revenue, aggregate average price levels, and for Hawaii, price trends over time for major species. In time-series of prices and revenues, it is appropriate to adjust value for the rate of inflation so that values throughout the time period are comparable (based on a consistent purchasing power for the dollar). Both the unadjusted and adjusted aggregate average price and aggregate revenues are plotted to clarify the relative change over time.

1.2 Definition of Indicators

Indicators were developed as tools for identifying signs of stress in the stocks or the fishery which deserve further investigation and/or a management response. Analyses consider how the indicators change over time. Indicators for Hawaii include 95% confidence intervals. To the degree possible, similar variance estimates are expected from the other areas in future annual reports. The indicators are defined as follows:

1.2.1 Aggregate Catch-Per-Unit-Effort

If the current year's aggregate catch-per-unit-effort (CPUE) is less than 50% of the average aggregate CPUE for the first three years of available data, there may be cause for concern. CPUE information is available for all areas; research CPUE is available for SE Hancock Seamount for all years since 1985, except in 1992 and 1994-2000.

1.2.2 Mean Fish Size

If there has been a significant reduction in mean fish size for a species over time, the stock may be stressed by the fishery. Mean size information is provided for nine species in Hawaii.

No mean size information was available at this time for American Samoa, Guam or the Northern Marianas.

1.2.3 Percent Immature

If over 50% of the catch for a species is below the size of first maturity, the stock may be stressed by the fishery. Information for this indicator by species is available only from Hawaii.

1.2.4 Spawning Potential Ratio

The spawning potential ratio (SPR) is the ratio of the spawning stock biomass per recruit, at the current level of fishing, to the spawning stock biomass per recruit that would occur in the absence of fishing. According to the overfishing definition contained in the Bottomfish FMP (Amendment 3, 1990), if SPR is less than or equal to 0.20, recruitment overfishing has occurred (i.e., spawners have been reduced to 20%, or less, of their unexploited stock level). Data to calculate SPR were not available from Guam or the Northern Marianas. An estimate of the "worst case" SPR was calculated for American Samoa's bottomfish complex using Dory Project data to estimate the virgin population CPUE and information on percent of immature fish from Hawaii. In Hawaii, SPR was calculated for five major species in the Hoomalu and Mau Zones, of the NWHI, and the MHI; some SPR values changed slightly from previous year's reports due to improvement in the calculations. SPR for armorhead was calculated annually since 1985, except for 1992 and 1994-2000.

1.2.5 Economic Indicators

Revenue per trip plots are presented for all areas except the MHI. A more valuable indicator for the commercial fisheries, which may be available in the future, would be net revenue (ex-vessel revenue minus costs per trip). Net revenue is available only from the Hoomalu Zone and Mau Zone in Hawaii.

2.0 AREA SUMMARIES

2.1 American Samoa

2.1.1 Descriptors

During 2000, a total of 17 local boats landed an estimated 27,900 pounds of bottomfish, (about 60% increase from last years landings) Revenues for the domestic commercial fishery this year was estimated around $53,400 (a 33% increase from last year) with all the catch being sold locally. The CPUE for 2000 (10.2 lb/hr) was not less than 50% of the aggregate CPUE for the first 3 years of available data.. In 2000, effort (trips and hours) about doubled with a couple of boats that fished last year not landing any bottomfish this year.

Regarding some of the SFA amendments: *Commercial* Bottomfish Landings and Revenues statistics for American Samoa is presented in Figure 2 of the Appendix 1. No *Recreational* trip was recorded this year. Recreational fishing is more associated with the pelagic fisheries and usually never occurs in this fishery. There was no *chartered* bottomfish trip during this year. Last year, DMWR added a field in the Offshore Creel Survey Interview Form to start recording bycatch data but no bycatch was recorded this year. In the *Preliminary Draft of EFH, Amendment for Bottomfish, WPRFMC Feb.1998,* the approximate MSY estimate for American Samoa [196 nautical miles 100-fathom isobath] is estimated at 79,000 lbs. per year. Total bottomfish landings estimate for this year is only 27,900 pounds. A more accurate MSY should be determined and used for this analysis in the future.

2.1.2 Indicators

CPUE (pounds per hour), though relatively stable (at about 10 lb/hr) in the early 1990's, increased in 1996 to 14.8 lb/hr, mainly due to improved sampling. CPUE declined by about 7% in 1999 to 12.9 lb/hr and further declined in 2000 to 10.2 lb/hr. This level is not less than 50% of the average aggregate CPUE for the first three years of available data (9.7 lb/hr), indicating no cause for concern. Bottomfish revenue per trip (as opposed to total revenue) remained stable for the fourth straight year in 2000, after a three-year declining trend.

2.1.3 Recommendations

2000 Recommendations

A. Examine the performance of current samplers to ensure the necessary quality and integrity of sample data.
B. Investigate if there are needed biological and stock assessment projects related to this fishery, i.e. the DMWR oceanic fisheries proposal.
C. Expand the fields in the offshore creel census forms for by-catch data collection as in Guam and train the interviewers in a more focused approach for acquisition of by-catch information.

2.2 Guam

2.2.1 Descriptors

The fairly large fluctuations over time in bottomfish landings in Guam appear to be due more to entry and exit patterns of fishermen, rather than changes in fish stocks. The number of highliners fishing in the area doubled from 1993 to 1994, increasing the total commercial BMUS harvest and revenue by nearly 300% during that year. In 1999, the total BMUS landings increased by 46%, making 1999 the fourth highest BMUS landings in the 15 year data history and 25% above the 15-year average. 2000 landing continued to increase with 18% greater landings over 1999.

The increase in total bottomfish and total BMUS in 1999 was due to fishermen concentrating on the deepwater complex. The significant increase in onaga landings in 1999 was due to a single fishermen fishing that complex. In 2000, an increase in BMUS landings was due to significant increases in lehi, the red-gilled emperor, the yellowtail kalikali, and jacks landings (280%, 180%, 200%, and 256% respectively). This may be due to fishermen fishing the boundary between shallow and deep water.

The harvest of total bottomfish and BMUS from the charter sector, however, decreased significantly in 2000, 38% and 49% respectively. These boats tend to release a majority of their catch, although their catch tends to be juvenile goatfish and triggerfish. The charter boats in Agat made up 87% of charter bottomfishing trips.

The adjusted average price for bottomfish has not shown consistent marketing trends. This is believed to have resulted from the seasonal supply of pelagic fish and difficulties in developing a consistent market for locally caught fish. In addition, imported fish from other islands around the region have contributed to the continued marketing problem for local fishermen. The 1999 inflation-adjusted average bottomfish price of $3.61 continues a 34% four year increase and is up 10% from 1998 ($3.30). The 1999 average price is still only 85% of the long term average and may explain why local highliners have been rare in the bottomfish fishery in recent years.

2.2.2 Indicators

Total and BMUS bottomfish harvest increased in 2000, except the charter components. Total bottomfish landings increased 13% and total BMUS landings increased 27%, with the non-charter components increasing 15% and 32% respectively and charter components decreasing 38% and 49% respectively. The non-charter components made up 98% of the total bottomfish and BMUS harvest. The overall and non-charter CPUE also increased, 16% and 25% respectively, while the charter CPUE decreased 59%. Commercial sales of BMUS species increased 29% in 2000, although a 25% decrease was observed with the commercial adjusted revenue. The number of boats engaging in bottomfishing, overall bottomfish trips, and total hours spent bottomfishing decreased 24%, 24%, and 16% respectively.

2.2.3 Recommendations

2000 Recommendations:

A. Integrating the offshore and inshore creel census data and the fine-tuning of the offshore expansion program is ongoing. Invaluable technical assistance from NMFS has enabled DAWR to move closer towards providing statistics of confidence, mean fish size, and separating the shallow and deep water complexes. Inputting the remaining five years (1980 to 1984) of offshore data should be completed in 2001.

B. Complete the baseline biological survey of the red-gill emperor, *Lethrinus rubrioperculatus*, which remains the single most important data deficiency for the shallow water bottomfish resource for the Mariana Islands.

C. With additional funding from the WPACFIN program and technical assistance from the NMFS, Guam's DAWR should establish mean fish size, percent immature and SPR indicators for deep and shallow water bottomfish complexes.

2.3 Hawaii

2.3.1 Descriptors

Main Hawaiian Islands: Only commercial data are available for both the MHI and NWHI fisheries, even though the MHI recreational/subsistence catch is estimated to be about equal that of commercial landings. In 1988, there was a dramatic increase in MHI bottomfish landings due to a bonanza uku (gray snapper) harvest. A steady decline in total landings occurred until 1993, which was the lowest recorded annual value. Landings increased 32% in 1994 and remained high through 1997, although CPUE was at a 12 year low in 1997. Participation and landings have declined over the past two years while CPUE has increased 29% in that same period. 1999 landings of 374,000 pounds are the second lowest total landings in recent records and may be correlated to a 17% decrease in the total number of trips.

Total ex-vessel revenue from the MHI shows a general decline from 1988-1996 and has stabilized since. 1998 inflation adjusted revenue was the lowest since 1974, and one-third of 1988's value. Revenue increased 14% in 1999, but still remains low for recent years.

NWHI Mau Zone: Mau Zone 1999 landings decreased 18% from 1998 due to a 23% decrease in number of trips from 39 in 1998 to 30 in 1999. Catch per trip increased by 7% in this zone. The total number of boats remained stable at 7.

NWHI Hoomalu Zone: Hoomalu Zone 1999 landings increased 1% from 1998. Six boats fished in 1999, one less than in 1998. The number of trips decreased by 4% from 50 to 48. Bottomfish landings per trip increased by 5% based on NMFS CPUE.

Available revenue data are not separated by zone. Overall NWHI inflation adjusted revenue had been relatively stable. With the 24% decline in 1998 being recovered with a corresponding increase in 1999. This large fluctuation was mostly caused by the yo-yo affect of the the inflation adjusted average bottomfish price in these two years.

2.3.2 Indicators

Hawaii Archipelago-wide:

SPR values for the five major BMUS species in 2000 are all above the 20% critical threshold level, that defines recruitment overfishing under the FMP, when viewed on an archipelago-wide basis. Of these species, onaga is still the lowest with a 2000 value of 27%. Implementation of the state's management plan should help improve the condition of onaga in the MHI and continue to increase the archipelago-wide SPR.

SPR values are also presented on a management zone basis (MHI, Mau Zone, Hoomalu Zone) for the purpose of determining locally depleted resources.

MHI: CPUE in 2000 decreased slightly from 1999 but remained above 1997 and 1998 levels. Recent CPUE values are approximately one-fourth the early (baseline 1948-50) values, signifying local depletion in the MHI. Most of the more commercially important species in the MHI have had relatively stable mean weights since 1984. Hapuupuu's mean weight dropped sharply in 1993 and has continued to be low. The small number of fish upon which the annual estimates are based may bias the result. However, with so many years in a row recording low mean weights, it is likely that marketed fish size has actually declined for MHI hapuupuu. Such a decline in mean size indicates increased

stress on the MHI hapuupuu resource. These values do not exhibit a continuing decline, in fact, the 1997-2000 values are slightly greater than the 1995 lowest value.

For the seventh year 95% confidence intervals were constructed based on "best" and "worst" case bounds of SPR components (CPUE and percent immature). For the fifth year SPR values were calculated using both aggregate CPUE, as in previous years, and targeted CPUE, which gives a more accurate picture for individual species. 2000 aggregate CPUE SPR values for all five major species declined but remained above the 20% critical level, except for onaga: onaga (0.06), opakapaka (0.21), hapuupuu (0.25), ehu (0.26), and uku (0.26). The use of targeted CPUE showed a different picture for the four species where targeted trips are available. Here, ehu SPR is much worse than indicated using aggregate CPUE (SPR = 0.08), whereas SPR values for opakapaka and uku are much higher than previously indicated (SPR = 0.35 and 0.33, respectively). Onaga's SPR remains consistent when using targeted or aggregate CPUE and has now been below 0.20 for 9 of the past 10 years and ehu for all of the last 10 years (using targeted CPUE).

NWHI Mau Zone: The NMFS CPUE data are only available for the NWHI fishery as a whole since 1984 and by zone since 1988. The NWHI (combined Mau and Hoomalu Zones) NMFS CPUE steadily decreased from 1987 to 1992, rose in 1993, and then declined from 1994-96. CPUE rose in 1997 to the 1993-94 level, but dropped slightly in 1998. CPUE remained essentially the same in 1999 at 486 lb/day and increased in 2000 to 513 lbs/day. The Mau Zone NMFS CPUE had been steadily decreasing since 1989, but increased in 1993 and 1994. In 1997, NMFS CPUE rose 49%. The CPUE declined 15% in 1998 and 7% in 1999 to 337 lb/day. Mau Zone CPUE dropped to 260 lbs/day in 2000 to similar levels as in 1992 and 1993. Mean weights of fish in the Mau Zone continue to exhibit year to year fluctuations, but are generally at much higher values than MHI mean weights. The percent of immature fish in the 2000 Mau Zone catch was still safely under 50% for all species evaluated.

SPR values in the Mau Zone have been decreasing since 1990 (mirroring the pattern in the HDAR CPUE), experienced a surprising rise in 1994, returned to lower levels in 1995, followed by a continued four year increase through 1999. All values are presently above well above the critical level of 0.20, except for onaga which dropped from 61% in 1999 to 29% in 2000. Notable decrease in 2000 onaga SPR values for the Mau Zone is due to increases in the percent of immature onaga in the catches of this zone. SPR values are higher in the NWHI than the MHI because most of the catch is mature fish.

NWHI Hoomalu Zone: The Hoomalu Zone NMFS CPUE has been on a downward trend from since data collection began in 1988. 2000 CPUE continues to increase to 601 lb/day from an 11-year low in 1998. Pounds per trip increased by 12% in 2000. Mean weights of fish in the Hoomalu Zone continued to exhibit year to year fluctuations, but are still at much higher values than MHI mean weights. The percent of immature fish in the 2000 catch was still safely under 50% for all species evaluated.

The SPR values in the Hoomalu Zone increased for all species except onaga, which dropped to 49% in 2000 from 54% in 1999. Other species 2000 SPR levels range from 73% to 74%.

Seamount Groundfish (Armorhead): No fishing has been allowed on the armorhead stocks of the SE Hancock Seamount since the moratorium began in August, 1986. The 1993 CPUE, calculated from research longline catches, was more than double that of the last assessment (in 1991) and nearly as high as the highest CPUE recorded since surveying began in 1985. No research cruise occurred since 1993, and future research assessment cruises are unlikely.

No SPR values were available in 2000 as no research was undertaken. In 1993, SPR within the EEZ (SE Hancock Seamount) was above 0.02, the highest since 1986, but still far below (10% of) the threshold level for recruitment overfishing of 0.20. About 99% of the known armorhead seamount habitat occurs outside the U.S. EEZ, an area which had 0.06 SPR in 1993. During February and March 1997, an oceanic and larval armorhead survey over the seamounts outside the U.S. EEZ was conducted onboard the R/V Kaiyo Maru by the National Research Institute of Far Seas Fisheries Laboratory in Shimizu, Japan. Armorhead larvae were collected from surface waters around all seamounts except for Koko Seamount.

2.3.3 Recommendations

2000 Recommendations

A. Recommends that the Council endorse the fishermen's recommendations regarding implementing the following mitigation measure policies and note that these are reasonable measures to reduce potential fishery interactions with monk seals:
   a. Bottomfishers must stop fishing and retain all gear on deck whenever a monk seal is sighted in an area within a 10 yard radius of where fishing operations are ongoing. If the monk seal remains in this designated area for more than two hours, the Master of the vessel shall relocate to other fishing grounds where there are no monk seals.
   b. Bottomfishers must retain all injured and/or dead by catch. Discard of offal shall occur after fishing operations have ceased and only if there are no monk seals in the area.
B. Recommends that annual protected species and regulatory workshops be held for all NWHI bottomfish permit holders and vessel operators to include training on monk seal life history, mitigation efforts, etc.
C. Recommends that a Council staff/member be included and participate on the Hawaiian Monk Seal Recovery Team.
D. Recommends regular reporting to the Council by the Honolulu Laboratory Marine Mammal Research Program on monk seal recovery efforts, research and budget needs to assist the Council in bottomfish management decisions.
E. Recommends, given the NWHI Coral Reef Reserve will limit the number of NWHI bottomfish permits, that the Council consider removing the existing landing requirements in the Mau and Hoomalu Zone limited entry management programs and retain all existing permit holders. The Council should also consider allowing the existing permit holders the flexibility to charter or lease their permits/vessels.
F. Recommends that NMFS and the Council modify the proposed framework adjustment amendment to add new entry criteria for the Mau Zone as suggested by the previous recommendation and proceed as soon as possible with its implementation.
G. Reminds the Council that Midway-based charter fishing operations are required to obtain appropriate commercial fishing licenses and permits and report catches of pelagic and bottomfish taken outside of the Midway National Wildlife Refuge to the NMFS and the State of Hawaii.
H. Supports the use of Midway as a refueling and reprovisioning station for the NWHI bottomfish vessels.
I. Supports the idea of a test program using video technology on bottomfish vessels to monitor for protected species interactions. The Team also urges the electronic collection of size frequency, incidental catch and bycatch information in the fishery if such a test program were initiated.

2.4 Northern Mariana Islands

2.4.1 Descriptors

Data are available only on the commercial fishery. Landings of bottomfish seem to have significantly dropped from last year (18.2% fewer pounds in 2000 than in 1999), although they remain 23.5% higher than the 18-year mean. In 1999, bottomfish landings also decreased, but by a much smaller percentage (3.1% less than 1998). The causes of this decline are unknown, but a two of factors certainly contributed. These were changes in the high liners participating in the fishery, and an increased number of local fishermen focusing on reef fishes in preference to bottomfishes. In 2000, the number of vessels fishing increased to 65 following from 50 in 1999 and 1998. The number of trips more than doubled in 2000 to 632 which is the highest number of trips recorded. The target of many of these trips have focused on reef species as compared to deep slope complex species which resulted in a total reduction in bottomfish landings in 2000.

Both the unadjusted and adjusted prices fell steeply in 2000. The unadjusted price was the lowest in 6 years, and the adjusted price was the lowest in 7 years. Both prices were lower than the mean for the last 18 years. The total 2000 ex-vessel revenue dropped steeply to $103,000.

2.4.2 Indicators

The average bottomfish catch per trip fell steeply from 157 lb/trip in 1999 to 58 lb/trip in 2000. Although the average catch per trip is not a very good measure of CPUE, because it is subject to significant biases (e.g., changes in trip length and relative amounts of bottom fishing compared to trolling or reef fishing); it is the only measure readily obtained from the commercial landings system. However, the smaller vessels commonly make mixed trips and the relative proportions of bottom fishes to pelagic and reef fishes seem to be changing. The number of fishermen selling both pelagic fishes and bottom fishes decreased from 11.5 to 3.0%, the number selling both pelagic and reef fishes increased from 4.8 to 9.9%, and the number selling only reef fishes increased from 10.3 to 36.2%. Given that fishermen appear to be changing the focus of their trips to include more reef fishing and less bottom fishing, this measure is an increasingly inaccurate portrayal of the actual CPUE. It has been suggested that it may be possible to improve this measure of CPUE by using only those trips that landed bottomfish exclusively. However, in the past 4 years only 2 fishermen exclusively sold bottomfishes in 1997, 1 in 1998, none in 1999 and 1 in 2000. These numbers are too low to be indicative of the entire fishery.

Revenues are also much reduced (35.7% less than in 1999). Although the unadjusted revenue for 2000 is greater than the mean for the last 18 years, the inflation-adjusted value for 2000 is the lowest of the last 7 years and only 9.2% more than the mean for the last 18 years. This is a result of the combined effect of fewer pounds landed and a lower price per pound for almost all bottomfish species.

2.4.3 Recommendations

2000 Recommendations

A. Request NMFS and the Council to assist DFW in adequately assessing the status of deepwater bottomfish stocks in the southern islands of the CNMI.
B. Establish a baseline (virgin stock) estimate for CPUE the Guam/Northern Marianas deepwater bottomfish complex (e.g., survey on grouper, snapper) utilizing data collected from the current fishery in the Northern Islands.
C. Establish a baseline (virgin stock) estimate for CPUE the Guam/Northern Marianas shallowwater bottomfish complex (e.g. redgill emperor) by sampling program aboard DFW research vessel to help calculate SPR, with assistance from NMFS.
D. With assistance from NMFS/WPACFIN, software should be developed and implemented to separate fishery statistics for the main islands fishery and from the Northern Islands fishery with separate description and statistics reported in the annual report module.
E. With assistance from NMFS/WPACFIN, determine the age structure of redgill emperor populations in the southern islands of the CNMI.

2.5 Region-Wide Recommendations 2000

A. Request the Council support a region-wide study of the decadal and inter-annual environmental factors that affect bottomfish resource abundance as shown by indicators such as CPUE.
B. Assess the effects on MSY, CPUE, SPR, etc. due to the concentration of effort from the establishment of area closures and MPAs.

Appendix 1

American Samoa

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Summary

American Samoa's bottomfish fishery was relatively bigger between 1982 and 1986 than in recent years (Figure 1). This observation reflects a trend in the loss of skilled and full-time commercial fishermen from the fishery, gradual depletion of newly discovered banks (e.g., 2% Bank), the shift of preference from bottomfishing to trolling and, recently, the diversion of effort by the highliner bottomfish fishermen towards longlining. The December 1992 hurricane contributed to the slight 1992 decrease in landings (Figure 1) and the lowest number of trips recorded for the period 1982-1991 (Figure 3). Compared to the 1982-1986 period (there was a hurricane in 1987), the past five years' landings, effort and subsequently revenues were notably less. This is mainly due to the highliners diverting their efforts towards the more profitable longlining method and the unattractive prices resulting from the influx of imported bottomfish from western Samoa

During 2000, a total of 17 local boats landed an estimated 27,900 pounds of bottomfish, (about 60% increase from last years landings) Revenues for the domestic commercial fishery this year was estimated around $53,400 (a 33% increase from last year) with all the catch being sold locally. The CPUE for 2000 (10.2 lb/hr) was not less than 50% of the aggregate CPUE for the first 3 years of available data.. In 2000, effort (trips and hours) about doubled with a couple of boats that fished last year not landing any bottomfish this year.

Regarding some of the SFA amendments: ***Commercial*** Bottomfish Landings and Revenues statistics for American Samoa is presented in Figure 2. No ***Recreational*** trip was recorded this year. **Recreational** fishing is more associated with the pelagic fisheries and usually never occurs in this fishery. There was no ***chartered*** bottomfish trip during this year. Last year, DMWR added a field in the Offshore Creel Survey Interview Form to start recording **bycatch data but no bycatch was recorded this year.** In the *Preliminary Draft of EFH, Amendment for Bottomfish, WPRFMC Feb.1998,* **the approximate MSY estimate for American Samoa** [196 nautical miles 100-fathom isobath] is estimated at 79,000 lbs. per year. Total bottomfish landings estimate for this year is only 27,900 pounds. A more accurate MSY should be determined and used for this analysis in the future.

Indicators derived from current data do not dictate immediate management response at this time.

The following selected annual statistics, dating back to 1982 provides a brief historical snapshot of American Samoa's bottomfish fishery:

Selected Historical Annual Statistics

Year	Total Landings (lb)	CPUE (lb/trip-hr)	Adjusted Revenue	Adjusted Price/Lb.	CPI	Number of Boats
1982	64942	8.5	$189388	$3.05	100.0	27
1983	126327	10.0	$445063	$3.56	100.8	38
1984	94104	10.7	$270739	$2.92	102.7	48
1985	143225	8.1	$227382	$2.22	103.7	47
1986	95978	8.8	$221953	$2.33	107.1	34
1987	31148	11.7	$69335	$2.27	111.8	20
1988	63064	17.3	$140375	$2.33	115.3	26
1989	47482	16.7	$77239	$2.13	120.3	29
1990	14303	9.2	$26684	$2.13	129.6	19
1991	18677	9.1	$39319	$2.22	135.3	20
1992	13316	9.3	$33625	$2.53	140.9	14
1993	17518	7.3	$34871	$2.23	141.1	22
1994	44982	7.7	$98843	$2.39	143.8	19
1995	34414	9.8	$71642	$2.11	147.0	25
1996	38522	14.8	$79247	$2.09	152.5	26
1997	39863	14.7	$87706	$2.29	156.4	24
1998	15862	14.0	$40133	$2.79	158.4	16
1999	17392	12.9	$40202	$2.66	159.9	19
2000	27949	10.2	$53416	$2.06	166.7	17
Averages	49951	11.1	$118272	$2.44		25.8
Std. Dev.	37840	3.0	$105750	$0.38		9.48

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Introduction

Bottomfish from canoes by the indigenous residents of the American Samoa islands has been a subsistence traditional practice since the distant past. It was not until the early 1970's that the bottomfish fishery developed into a commercial venture utilizing motorized boats. A government subsidized program, called the Dory Project, was initiated in 1972 to develop the offshore fisheries into a commercial venture, and resulted in an abrupt increase in the fishing fleet and total landings. In 1982, a fisheries development project aimed at exporting high-priced deep-water snappers to Hawaii caused another notable increase in both bottomfish landings and revenue. Between 1982 and 1988, the botttomfish fishery comprised as much as 50% (by weight) of the total commercial landings. Beginning in 1988, the nature of American Samoa's fisheries changed dramatically with a shift in importance from bottomfish fishing towards trolling. In the past seven years, the dominant (by weight of fish landed) fishing method has been longlining.

During the early 1980's, fisheries data was collected from the bottomfish fishery by interviewing only commercial vessels. In the current Offshore Creel Survey on Tutuila that started on October 1, 1985, commercial, subsistence and recreational domestic fishing boats landing catch in five designated areas were interviewed and their catch recorded. For two weekdays and one weekend/holiday per week, DMWR technicians normally sampled offshore trips between 0500 and 2100 hours. In the past 2 years, the sampling period was increased so as to cover not only bottomfish boats that land outside the sampling period, but to catch any other boats using other gears Two DMWR samplers based on Tau and Ofu collect fisheries data from the Manu'a islands fleet.

Boat-based fishing in American Samoa used to be mainly trolling and/or bottomfish. In the past five years, record longlining landings (mainly by the Alia commercial fishermen) were recorded with revenues approaching the one million-dollar mark. Bigger boats are entering the fisheries but these are rigged for longlining and more of these are expected to enter the territory's longline fishery, In light of the recent legal restrictions in Hawaii's longline fishery and the resolve by local residents that bigger and modernized boats are necessary to ensure profits and compete with foreign boats.

The bottomfish fishery of American Samoa was typically commercial overnight bottomfish handlining using skipjack as bait, on 28-30 foot aluminum Alias, built in western Samoa. Lower quality bottomfish imported from western Samoa helps satisfy the demand for bottomfish but at the same time result in unattractive prices for local bottomfish fishermen. The adverse effects of three hurricanes that struck American Samoa in 1987(*Tusi*), 1990 (*Ofa*) and 1991 (*Val*) can be seen in some of the trends in the fishery as depicted by the data in this report.

Central WPacFIN have continuously improved DMWR's data processing systems since 1982. Recent changes in the fishery and the necessary inclusion of associated and improved algorithms is mirrored in the slight differences in the statistics presented in these annual series of reports.

Recommendations

1999 Recommendation:

With the growing number of boats based on the island of Aunu'u, it is recommended that an Aunu'u-based DMWR sampler, similar to those based in Manu'a, be hired to collect fisheries data from all the Aunu'u-based fishing fleet.

2000 Recommendation:

In consultation with the Central and local WPacFIN coordinators, the new supervisor of the Offshore Creel Survey should:

(i) Examine the unsatisfactory performance of the current samplers to ensure the necessary quality and integrity of sampled data.

(ii) Investigate if there are needed biological and stock assessment projects related to this fishery, i.e. the DMWR oceanic fisheries proposal

(iii) Expand the fields in the Offshore creel census form for by-catch data collection as in Guam and train the interviewers in a more focused approach for acquisition of by-catch information.

Table 1. American Samoa 2000 Estimated Total Bottomfish Landings by Species.

Species	Pounds
Black snapper	156
Blue lined gindai	5
Blue lined snapper	4952
Ehu (squirrelfish snap.)	1630
Gindai (flower snap)	134
Gray jobfish	3968
Hawaiian opakapaka	350
Humpback snapper	1031
Lehi (silverjaw)	1106
Onaga (longtail snapper)	734
Onespot snapper	9
Rufous snapper	58
Stone's snapper	22
Yellow opakapaka	165
Yelloweye opakapaka(P.fl.	45
Yellowtail snapper	60
Groupers (misc)	435
Blacktip grouper	97
Flagtail grouper	80
Giant grouper	53
Lunartail grouper	1166
Smalltooth grouper	7
Striped grouper	15
Tomato grouper	343
Emperors (misc)	7567
Longnose emperor	374
Orangespot emperor	925
Jacks (misc)	2189
Black jack	272
Total Bottomfish	**27949**

Source: DMWR Offshore Creel

Interpretation: Changes in species composition of the bottomfish complex reported in the past are due to samplers' varying ability and commitment to the identification of the various bottomfish species. Current data and observations however, do not indicate any major changes in the composition of the bottomfish species landed.

Calculation: Catches are weighed by species either at landing sites or during the selling of fish to dealers. Trips missed by the Creel Survey and sold to local dealers are accounted for in a separate data collections system – the Invoice Purchase System. The above analysis is from the Offshore Creel Survey only. Analysis of the bottomfish fishery presented in this report is for the whole bottomfish complex and **not just for the BMUS.**

Table 2. American Samoa 2000 Estimated Commercial Landings by Species.

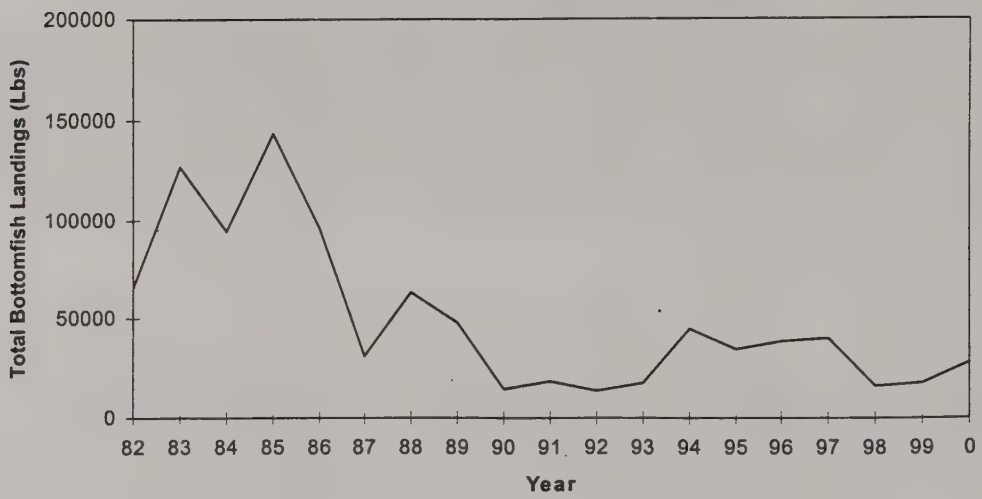
Species	Pounds	Price/Lb.	Value
Black snapper	156	$2.00	$313
Blue lined gindai	5	$2.00	$10
Blue lined snapper	4876	$2.12	$10356
Ehu (squirrelfish snap.)	1630	$2.95	$4801
Gindai (flower snap)	134	$2.00	$268
Gray jobfish	3912	$2.01	$7877
Hawaiian opakapaka	350	$2.00	$700
Humpback snapper	1031	$2.03	$2093
Lehi (silverjaw)	558	$2.03	$1131
Onaga (longtail snapper)	376	$2.00	$752
Onespot snapper	9	$2.00	$18
Rufous snapper	58	$2.00	$116
Stone's snapper	22	$2.00	$44
Yellow opakapaka	165	$2.12	$350
Yelloweye opakapaka(P.fl.	45	$2.00	$89
Yellowtail snapper	60	$2.00	$121
Groupers (misc)	295	$2.00	$590
Blacktip grouper	97	$2.30	$224
Flagtail grouper	46	$2.35	$108
Giant grouper	53	$2.47	$131
Lunartail grouper	630	$2.08	$1308
Smalltooth grouper	7	$2.50	$18
Tomato grouper	265	$2.26	$598
Emperors (misc)	7505	$2.02	$15152
Longnose emperor	374	$2.00	$748
Orangespot emperor	813	$2.00	$1626
Jacks (misc)	2151	$1.55	$3330
Black jack	272	$2.00	$544
Total Bottomfish	**25897**	**$2.06**	**$53416**

Source: DMWR Offshore Creel Survey Database

Calculation: Bottomfish landings for 1982-84 were calculated by adjusting the sampled Tutuila data by the calculated annual percent coverage of the fleet, and then adding the similarly adjusted Manu'a landings. The landings from 1986 to Present were calculated by expanding the Offshore Creel Survey Data for Tutuila for the species listed in Table 1. The sampled Manu'a landings were adjusted by adjusting for the monthly percent coverage of the fleet and added to the Tutuila data. Since the Offshore Creel Survey started in October 1, 1985, The first nine month of the 1985 landings were calculated as it was in 1982-84 and the last three months of the 1985 landings were calculated as it is now.

Interpretation: The substantial decline in landings in 1987 and 1990 were partially due to vessel losses caused by two hurricanes. Boat repairs were delayed as fisherman repaired or rebuilt their houses. In terms of total landings, the bottomfish fishery is much smaller in recent years than it was any time between 1982 and 1986, a period when there was a relatively large fleet and fishermen were attracted to the profitable bottomfish export program. The increase in 1994 was due primarily to improved sampling on Tutuila and increased efforts by the Tutuila highliners. Furthermore, the Manua landings more than tripled due to social/cultural events during that year. The 1998 decline mirror the 33% decrease in the number of boats participating. Landings and interest have increased since then with a few longline fishermen bottomfishing at times.

Figure 1. American Samoa Total Bottomfish Landings



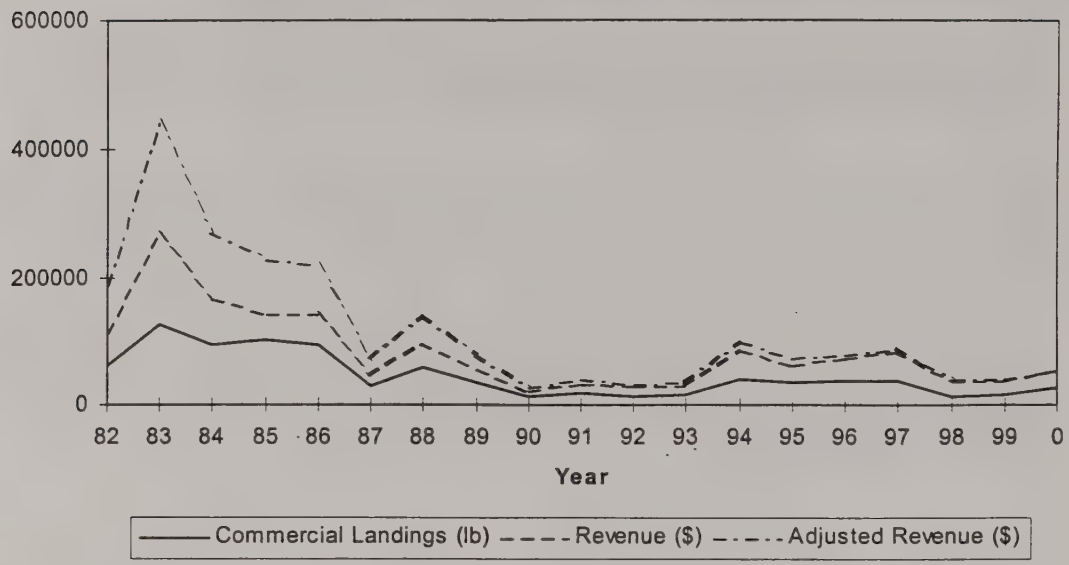
Year	Landings(lb)
1982	64942
1983	126327
1984	94104
1985	143225
1986	95978
1987	31148
1988	63064
1989	47482
1990	14303
1991	18677
1992	13316
1993	17518
1994	44982
1995	34414
1996	38522
1997	39863
1998	15862
1999	17392
2000	27949
Average	49951
Std. Dev.	37840

Source: DMWR Offshore Creel Survey and Commercial Invoice System

Calculation: During creel surveys, the disposition of the catch is recorded, and if sold, the price is obtained whenever possible. The average prices reported in this table are calculated by dividing the total revenue by the weight sold in pounds for each species.

Interpretation: There appears to be no major changes in the prices of individual species in the past seven years. DMWR keeps track of fish prices for imported fish and those missed by the Offshore Creel Survey through a separate data collection system – the Commercial Invoice System. Data from that data processing system reveals that since 1992, the average price of bottomfish imported from western Samoa were lower than locally caught bottomfish. Locally caught bottomfish are of much superior quality than those imported from western Samoa (and previously from Tonga) because of better handling and affordable ice. Local fishermen, therefore, expect comparatively higher prices. This was not the case last year as average prices dropped but regained this year.

Figure 2. American Samoa Estimated Commercial Bottomfish Landings



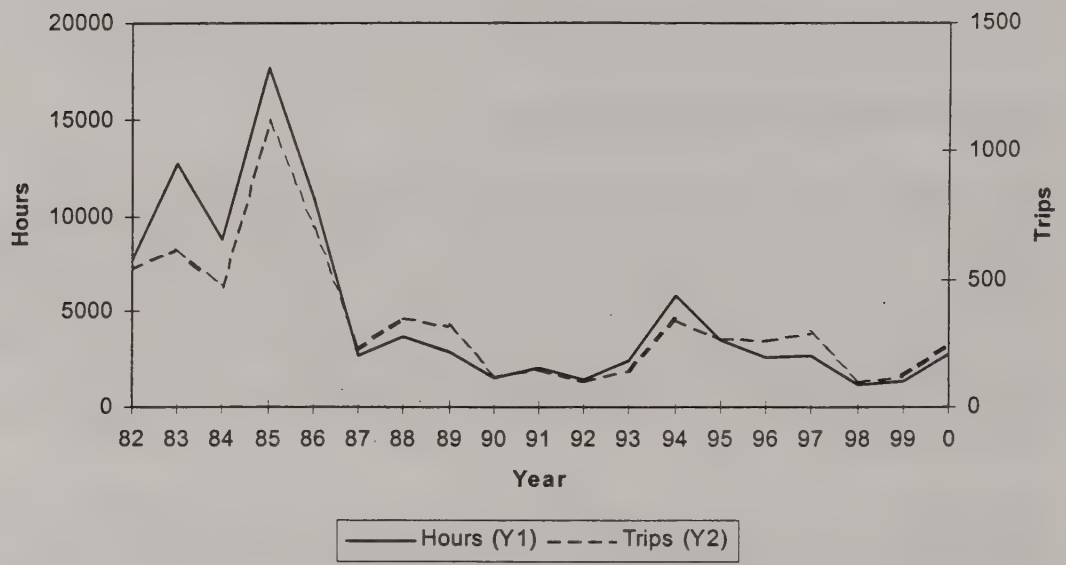
Year	Commercial Landings (lb)	Revenues	CPI	Adjusted Revenue
1982	62016	$113678	1.666	$189388
1983	125167	$269083	1.654	$445063
1984	92841	$166917	1.622	$270739
1985	102670	$141495	1.607	$227382
1986	95231	$142643	1.556	$221953
1987	30655	$46502	1.491	$69335
1988	60316	$97145	1.445	$140375
1989	36165	$55728	1.386	$77239
1990	12535	$20749	1.286	$26684
1991	17748	$31915	1.232	$39319
1992	13264	$28423	1.183	$33625
1993	15591	$29502	1.182	$34871
1994	41429	$85283	1.159	$98843
1995	33956	$63176	1.134	$71642
1996	37911	$72504	1.093	$79247
1997	38339	$82276	1.066	$87706
1998	14400	$38149	1.052	$40133
1999	15126	$38582	1.042	$40202
2000	25897	$53416	1.000	$53416
Average	45856	$83009		$118272
Std. Dev.	33600	$60506		$105750

Source: DMWR Offshore Creel Survey Database

Calculation: A relatively complex set of algorithms are used to estimate the commercial landings from estimates of total landings created by the creel survey data expansion system. In short the percent sold by species and by fishing method is calculated annually and multiplied by the estimated total landings by that method for that year. For 1982-85 sampling was conducted on the commercial fleet only (which included nearly all of the fishing boats), whereas since 1985 creel sampling has covered all boats (commercial and recreational). Analysis of creel data for 1986-87 indicates that over 98% of the landed bottomfish was being sold. Therefore is it believed to be valid to compare commercial data for years prior to 1986 to creel survey totals for years since 1986.

Interpretation: Commercial landings mirror the total fishery's declining catches in recent years. Relative to total landings, commercial landings decreased even more substantially in 1989, because the percent of the catch sold by bottomfish fishermen dropped from an average of about 97% in 1982-88 to 78% in 1989. The peak in 1983 portrays the high prices of deep-water snappers exported to Hawaii, while the trough in 1987 can be attributed to effects of the 1987 hurricane. The December 1991 hurricane contributed largely to the decreased landings and subsequently a decrease in revenues in 1992. Unfavorable weather continued through May 1992 hindering commercial bottomfish trips. Increased efforts in 1994 produced a notable increase in revenues. The decrease in the number of bottomfish boats resulted in the 1998 drop but has increased since. These trends parallels total landings (Figure 1).

Figure 3. American Samoa Estimated Bottomfish Hours and Trips



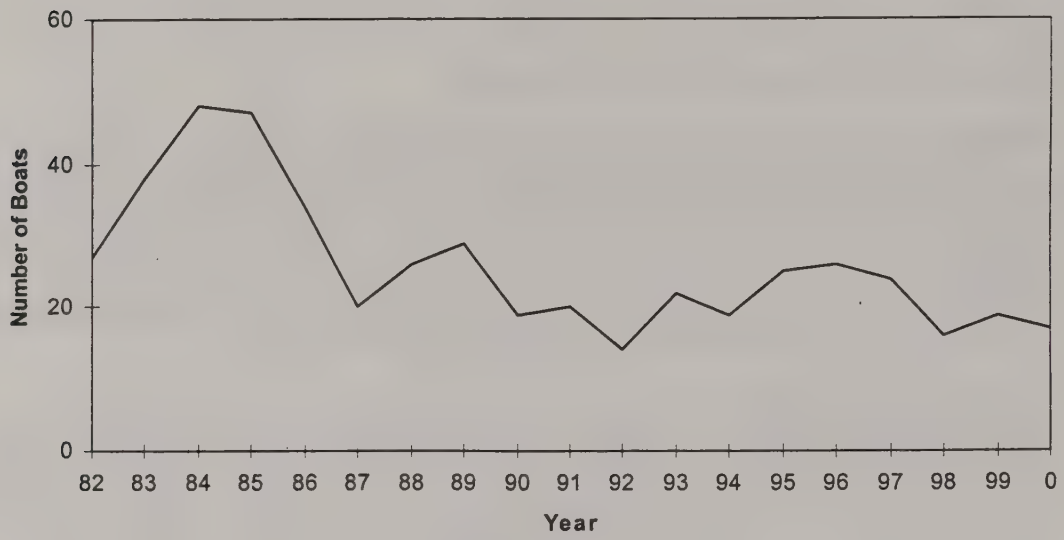
Year	Hours	Trips
1982	7671	548
1983	12695	621
1984	8796	468
1985	17682	1116
1986	10963	698
1987	2654	222
1988	3647	352
1989	2844	313
1990	1548	122
1991	2042	145
1992	1426	101
1993	2393	141
1994	5857	341
1995	3497	270
1996	2608	265
1997	2712	290
1998	1132	100
1999	1351	122
2000	2743	241
Average	4961	341
Std. Dev.	4452	251

Source: DMWR Offshore Creel Survey Database

Calculation: The annual estimated hours spent bottomfishing is calculated by dividing the annual total bottomfish catch by the average CPUE (pounds per hour) from trips doing only bottomfish fishing. The annual estimated number of trips is calculated by dividing the estimated annual hours by the average length of a bottomfish fishing trip. The average length of a bottomfish fishing trip (not shown) is calculated by using only trips which exclusively bottomfished and for which the trip length was recorded. The total hours fished from those trips is then divided by the number of trips. Recorded hours are trip hours.

Interpretation: The sharp decline in the bottomfish landings since 1986, noted in Fig.1 is mirrored in this figure by a sharp decline in the level of effort expended in that fishery. Rather than indicating a problem with the resource, this decline depicts an actual trend of commercial boat owners and fishermen seeking other more lucrative and stable lines of work. The noticeable increase in effort in 1996 was primarily due to improved sampling, increased effort by the Tutuila highliners and the significant (about tripled) increase in effort by the Manua fleet. The bottomfish highliners diverted part of their effort to do longlining in 1994 which contributed to the decrease in bottomfish trips and effort. The 1994-1996 estimated efforts were greater than those for the 1990-93 period due to the highliners increased efforts, with some boat owners employing teams (usually 2-3 fishermen) in continuous shifts during good weather. In 1998 the number of boats participating in this fishery dropped significantly (see Figure 4) resulting in the notable declines in the number of trips and hours fished that year. A few boats, bought from Western Samoa, entered this fishery in 1999r and contributed to the slight increase in effort last year. When prices and catches for albacore decreased for sometime during this year, some longline fishermen went bottomfishing.

Figure 4. American Samoa Annual Estimated Number of Boats Landing Bottomfish



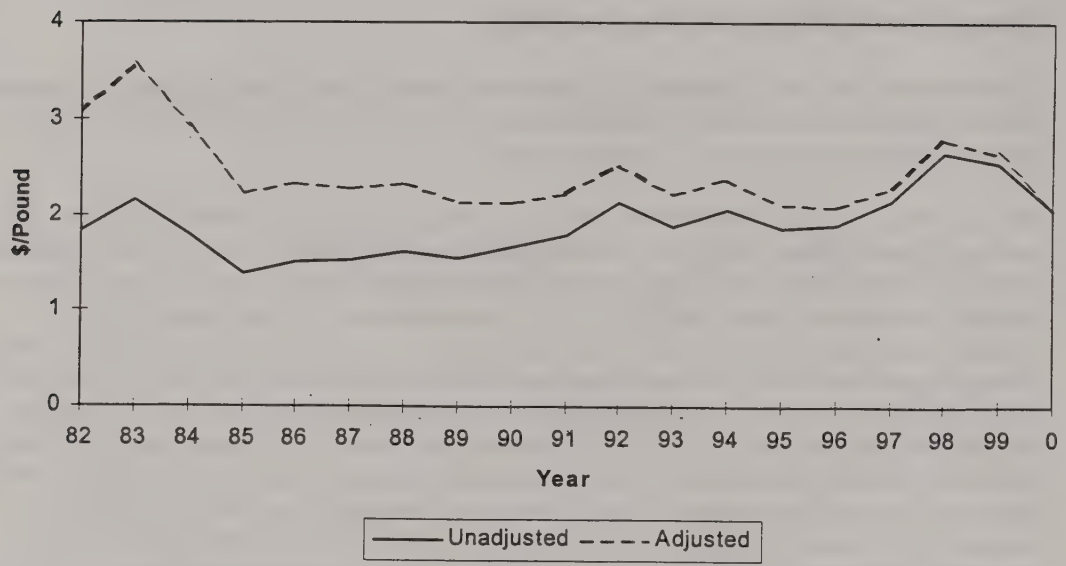
Year	Boats
1982	27
1983	38
1984	48
1985	47
1986	34
1987	20
1988	26
1989	29
1990	19
1991	20
1992	14
1993	22
1994	19
1995	25
1996	26
1997	24
1998	16
1999	19
2000	17
Average	26
Std. Dev.	9

Source: DMWR Offshore Creel Survey database

Calculation: The annual estimate of the number of boats in the bottomfish fishery is obtained from the data base by counting the unique boats sampled during the year which landed any bottomfish species regardless of fishing method.

Interpretation: Again, the decline in the fishery since 1985-86 is reflected by a decline in the number of boats participating in it. The 1987 hurricane caused the loss of the whole Manu'a fleet, plus some of the Tutuila fleet. Several Boats that contributed to the 1989 bottomfish annual landings did not land any bottomfish in 1990, due to much needed boat repairs and their participation in non-bottomfish chartered trips. About 90% of the domestic fishing fleet was affected by the December 1991 hurricane, hence the slight decline in 1992. The increase in 1993 is due mainly to the re-entry to this fishery of a few boats after repairs, trips by two 14-foot vessels that didn't bottomfish in 1992, and the entry of one new Alia into the sampling area. A few new Alias were bought from western Samoa and entered the fishery in 1995-1996. The continued increase in the number of boats electing to longline,(rather than bottomfishing) attracted by the relatively higher revenues obtained mainly from the albacore sold to the canneries, is reflected in the significant drop in the number of boats bottomfishing in 1998. A couple of new boats entered the fishery last year and about the same didn't land any bottomfish during this year.

Figure 5. American Samoa Average Price of Bottomfish



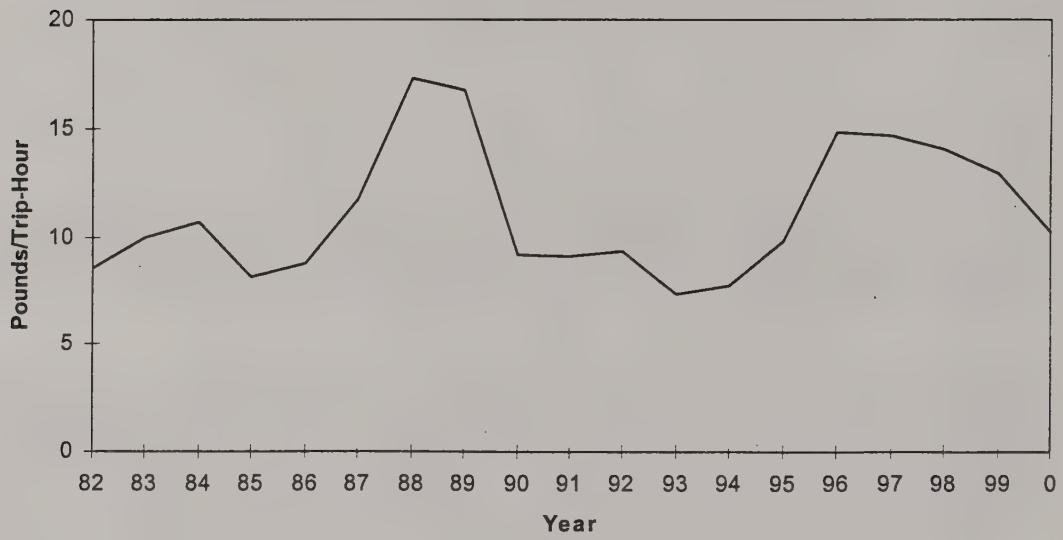
Year	Unadjusted Price/Lb	Adjusted Price/Lb
1982	$1.83	$3.05
1983	$2.15	$3.56
1984	$1.80	$2.92
1985	$1.38	$2.22
1986	$1.50	$2.33
1987	$1.52	$2.27
1988	$1.61	$2.33
1989	$1.54	$2.13
1990	$1.66	$2.13
1991	$1.80	$2.22
1992	$2.14	$2.53
1993	$1.89	$2.23
1994	$2.06	$2.39
1995	$1.86	$2.11
1996	$1.91	$2.09
1997	$2.15	$2.29
1998	$2.65	$2.79
1999	$2.55	$2.66
2000	$2.06	$2.06
Average	$1.90	$2.44
Std. Dev.	$0.33	$0.38

Source: DMWR Offshore Creel Survey database

Calculation: The average price of all bottomfish species combined is calculated by dividing total bottomfish revenue by total sold weight. The inflation-adjusted price is calculated by multiplying the unadjusted annual average price by the annual calculated consumer price index (CPI) for American Samoa using the current year as base.

Interpretation: Prices were generally higher between 1982 and 1984 during the exportation of high-priced deepwater snappers to Hawaii. After this period, inflation-adjusted local prices have generally been stable. Prices of locally caught bottomfish are generally higher than imported fish, and could have been even higher had the local markets not been flooded by imported fish, which are usually of lower quality. The only imported bottomfish in 1994 were from western Samoa and these were sold at an average price of $1.67/lb. Imported bottomfish (mainly from western Samoa) have always helped in meeting the demand for bottomfish. The increase in average price in 1998 is attributed mainly to the increase in demand for fresh bottomfish by a few new restaurants. Last year there was a 16% increase in pounds of fish (miscellaneous bottomfish and pelagics) imported from western Samoa and may contribute (increase supply) to last year's price drop, a similar scene with this years prices.

Figure 6. American Samoa Annual Bottomfish CPUE



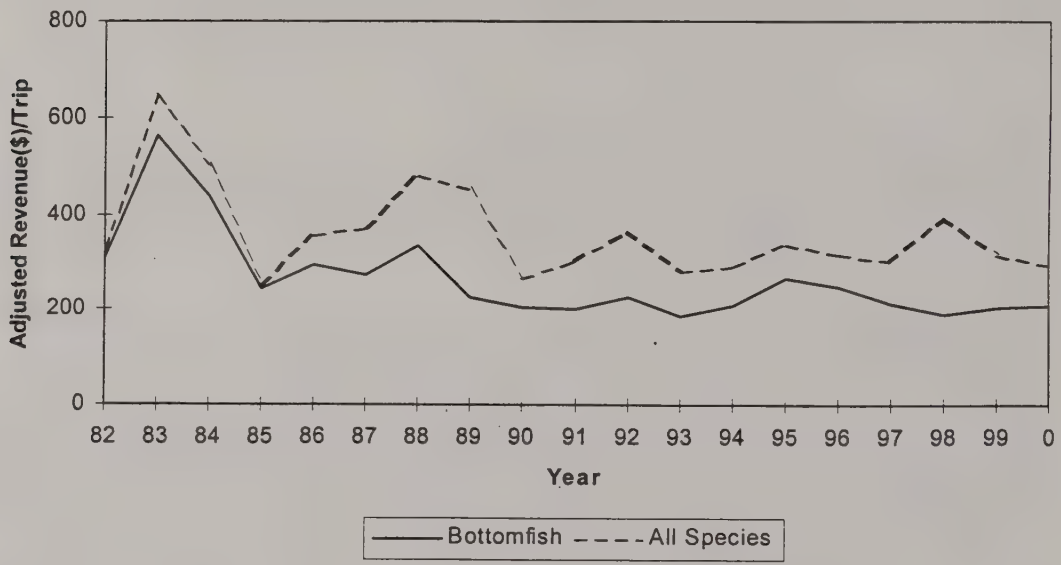
Year	CPUE
1982	8.50
1983	10.00
1984	10.70
1985	8.10
1986	8.80
1987	11.70
1988	17.30
1989	16.70
1990	9.20
1991	9.10
1992	9.30
1993	7.30
1994	7.70
1995	9.80
1996	14.80
1997	14.70
1998	14.00
1999	12.90
2000	10.20
Average	11.09
Std. Dev.	2.99

Source: DMWR Offshore Creel Survey database

Calculation: CPUE is calculated using only trips in which only the bottomfish method was used and trip hours were recorded. The average is calculated by using each CPUE from each trip as an observation and dividing by the number of trips.

Interpretation: The initial high CPUE in 1983 and 1984 occurred during the intense fishing of some new fishing grounds for deepwater snappers for export to Hawaii. A relatively high number of boats and local fishermen participated in the fishery during this period. The decline in 1985 and 1986 might be expected following the ardent harvesting of the limited fishing grounds. Reasons for the CPUE peak in 1988-89 are unknown. The decline in CPUE from 1989 to 1991 can be partially attributed to a combination of some new inexperienced fishermen entering the fishery and the exit of experienced and full-time commercial fishermen. CPUE has essentially remained stable during 1990-1992 and during 1996-1998 Bottomfishing techniques and gear have generally remained the same in the past years with the Alias being the highliners since the early 1970's. The 1996 high CPUE estimates (and most probably the 1988-89 CPUE increase) can be attributed mainly to improved sampling and may also be related to favorable environmental conditions. This also maybe representing cyclical trends that maybe caused by decadal and inter-annual climatic changes with similar trends shown in the Hawaii bottomfish fishery. The past three year's CPUE was not less than 50% of the average aggregate CPUE for the first three years of available data, indicating no immediate cause for concern.

Figure 7. American Samoa Average Inflation-Adjusted Revenue Per Trip Landing Bottomfish.



Year	Bottomfish Unadjusted	Bottomfish Adjusted	All Species Unadjusted	All Species Adjusted
1982	$185	$308	$196	$326
1983	$341	$564	$388	$642
1984	$269	$436	$309	$501
1985	$151	$243	$157	$252
1986	$189	$294	$228	$354
1987	$184	$274	$248	$369
1988	$231	$333	$331	$479
1989	$163	$226	$327	$453
1990	$160	$206	$205	$264
1991	$163	$201	$243	$300
1992	$191	$226	$307	$363
1993	$156	$185	$237	$280
1994	$181	$209	$250	$290
1995	$235	$267	$299	$339
1996	$226	$247	$289	$316
1997	$197	$210	$282	$301
1998	$182	$191	$372	$391
1999	$197	$205	$305	$317
2000	$208	$208	$293	$293
Average	$200	$265	$277	$360
Std. Dev.	$44	$92	$58	$95

Source: DMWR Offshore Creel Survey database

Calculation: The average revenue per trip for all species is calculated by summing the revenues of all sales for any trip which landed any bottomfish species, and dividing by the number of trips. The average bottomfish revenue per trip is calculated from those same trips by summing the sales of only bottomfish species and dividing by the number of trips. Figure 7 plots the inflation-adjusted bottomfish and all species revenue per trip for the period 1982-1999.

Interpretation: There have been no notable changes in revenues since 1990. The distance between these two lines reflects the relative importance of bottomfish species in the total catch whenever any bottomfish are landed. The prominent importance of bottomfish between 1982 and 1985 occurred during the targeting of deepwater snappers (mainly ***Etelis*** and ***Prisitipomoides***) for export to Hawaii. Bottomfish fishing was also the more profitable method of fishing during that period. The relative importance of bottomfish has generally been declining since 1985 as most of the full-time commercial fishermen quit the fishing with the remaining opting for trolling. The supply of locally caught bottomfish has been supplemented by bottomfish imported from western Samoa. Increases in revenues in 1999 and again this year is minimal but a positive sign for this fishery.

Appendix 2

Guam

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Summary

The new offshore creel survey expansion system utilizes a database format to expand the offshore survey data, rather than the spreadsheet format used in previous years. The new format separates the charter and non-charter components, allows for the distinction between the shallow and deep bottomfish complexes, and provides for the collection of bycatch data. This improvement, combined with the addition of the Merizo boat ramp in 1991 and the Agat Marina in 1994 as offshore sampling ports, and recent revisions of expansion algorithms have contributed to the increased efficiency in the production and reliability of the Guam annual reports. This has become important in recent years as overall fish stocks appear to be declining and management decisions are being made based on data that is collected and expanded. Although complemental statistics of confidence and analysis of biological and species composition data are not possible at this time, Guam's Department of Agriculture's Division of Aquatic and Wildlife Resources (DAWR) is continuing work with the WPacFIN program coordinator to further develop the expansion system to eventually include production of such analyses. Work is currently being done to integrate the inshore creel census data with the offshore creel census data in order to obtain a better idea of BMUS species recorded by both data collection entities of DAWR's Fisheries section.

The bottomfish fishery data in 1998 indicated that Guam's aggregate CPUE for all bottomfishing may have been in a "yellow light" condition, an indicator of fishery stress. However, the charter and non-charter components were expanded separately in 1999 and a "yellow light" condition was not observed with the non-charter component. The bottomfish charters, primarily the Agat Marina bottomfish charters, may have skewed the overall CPUE toward a "yellow light" condition due to the high effort and low catch of this component of bottomfishing. Nonetheless, anecdotal evidence from local fishermen and creel census data do show that the bottomfish fishery is stressed. The sizes of commonly caught bottomfish are decreasing, especially those of the shallow water complex. Unfortunately, these fish are usually not released despite their small size. In 2000, Guam began enforcing marine preserves that were established by legislation in 1997. This should reduce stress on reef fish stocks impacted by a host of fishing methods, which include bottomfishing.

Total and BMUS bottomfish harvest increased in 2000, except the charter components. Total bottomfish landings increased 13% and total BMUS landings increased 27%, with the non-charter components increasing 15% and 32% respectively and charter components decreasing 38% and 49% respectively. The non-charter components made up 98% of the total bottomfish and BMUS harvest. The overall and non-charter CPUE also increased, 16% and 25% respectively, while the charter CPUE decreased 59%. Commercial sales of BMUS species increased 29% in 2000, although a 25% decrease was observed with the commercial adjusted revenue. The number of boats engaging in bottomfishing, overall bottomfish trips, and total hours spent bottomfishing decreased 24%, 24%, and 16% respectively.

Historical Annual Statistics

Year	Total Bottomfish Landings (lbs)	CPUE (lbs/hour)	CPI	Adjusted Revenue ($)	Adjusted Price/lb ($)	Number of Boats
80			134.00	43,186	4.60	
81			161.40	58,168	5.56	
82			169.70	37,953	5.74	
83			175.60	188,501	5.20	
84			190.90	106,266	5.28	
85	86,035	5.7	198.30	131,875	4.87	161
86	36,839	5.2	203.70	52,774	4.60	118
87	44,829	5.8	212.70	55,911	4.42	139
88	67,777	4.9	223.80	66,706	4.22	198
89	83,924	5.6	248.20	95,703	4.92	223
90	77,367	4.5	283.50	87,239	4.74	226
91	71,216	4.8	312.50	48,857	4.54	246
92	86,911	5.8	344.20	43,145	4.17	236
93	98,387	4.2	372.90	39,738	3.92	360
94	109,050	5.6	436.00	121,390	4.01	298
95	106,437	2.5	459.20	48,321	3.62	402
96	153,123	4.1	482.00	18,332	2.79	408
97	102,699	3.7	482.50	29,389	3.13	332
98	97,779	2.6	485.30	44,728	3.44	354
99	129,419	3.2	494.90	111,620	3.66	411
00	**146,481**	**3.7**	**505.00**	**80,947**	**3.55**	**312**
Average	93,642	4.5	313.11	71,940	4.33	277
Std. dev.	32,017	1.1	133.27	41,510	0.79	97

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Introduction

There are two distinct bottomfish fisheries on Guam that can be separated by depth and species composition. The shallow water complex (<500 feet) makes up a larger portion of the total bottomfish effort and harvest, and is comprised primarily of reef-dwelling snappers, groupers, and jacks of the genera *Lutjanus*, *Lethrinus*, *Aprion*, *Epinephelus*, *Variola*, *Cephalopholis* and *Caranx*. The deepwater complex (>500 feet) consists primarily of groupers and snappers of the genera *Pristipomoides*, *Etelis*, *Aphareus*, *Epinephelus*, and *Cephalopholis*.

Bottomfishing on Guam is a combination of recreational, subsistence, and small-scale commercial fishing. This fishery can be highly seasonal in that effort significantly increases when sea conditions are calm, generally during the summer months. During these periods, bottomfishing activity increases dramatically on the east side of the island, a more productive fishing area that is inaccessible during most of the year due to rough seas. The majority of people in this fishery are either subsistence or part-time recreational fishermen that operate vessels less than 25 feet in length, target primarily the shallow water bottomfish complex, combine some trolling effort to supplement their bottomfishing effort, and seldom sell their catch commercially.

The Agana Boat Basin is centrally located on the western leeward coast and serves as the island's primary launch site for boats fishing areas off the central and northern leeward coasts and the northern banks. The Merizo boat ramp, Seaplane Ramp in Apra Harbor, Umatac boat ramp, and Agat Marina are boat launch sites which provide access to the southern coast, Apra Harbor, Cocos Lagoon, and the southern banks. The Agat Marina in particular, located between the Agana Boat Basin and the Merizo boat ramp, provides trailered boats from the northern and central areas of the island a closer and more convenient launch site to the southern fishing grounds. A makeshift ramp at Ylig Bay provides access to fishing areas on the eastern side of the island, and is heavily used during periods of calm weather. Bottomfishing during these times can be significant. At present, DAWR conducts its offshore creel surveys at the Agana Boat Basin, the Agat Marina, and the Merizo boat ramp.

A significant addition to bottomfishing activity effort in recent years is the charter fishing component that includes boats making multiple two to four hour trips daily. These charter vessels range from typical trolling charter boat with patrons who opt to bottomfish, to larger bottomfishing-only vessels that can accommodate as many as 35 patrons per trip. These larger vessels fish in the same general area and release most of their catch, primarily small triggerfish, small groupers, and small goatfish. These boats, however, will occasionally keep larger fish and use a portion of the catch to serve as sashimi for their guests.

DAWR began collecting information on bycatch as part of its offshore creel census at the beginning of 2000 as a requirement of the bottomfish FMP. This will provide information on the effect bottomfishing may have on fish species that are caught but discarded, a practice observed quite frequently with the charter sector.

The demand for both deep and shallow-water bottomfish continues to exceed the locally-caught supply. Although Guam's deepwater bottomfish fishery has limited economic importance, especially in the absence of highliner vessels, the cultural value of the shallow water complex

remains high due to the popularity of this assemblage of fish as food items. Some of the demand for bottomfish is offset with imports from the Philippines and Micronesia, although there is a clear preference for locally caught fish. This demand, however, may be contributing to the overall decline in nearshore and reef-associated bottomfish populations.

Recommendations

Status of 1999 recommendations

1. The integration of the offshore and inshore data systems has been ongoing during 2000. This integration would provide a more correct estimation of the harvest of BMUS species on Guam. Efforts to develop and fine-tune the database computer program that will provide DAWR with the capability of integrating the offshore survey expansion data with the inshore expansion data, and additionally produce statistics of confidence, a compilation of biological data, and a complete species composition analysis according to Plan Team requirements is ongoing with the assistance of NMFS.

2. Completing the baseline biological survey of the red-gill emperor, *Lethrinus rubrioperculatus*, was not possible during 2000 due to an increased work load as a results of losing three senior fisheries staff and their duties being given to the remaining five biologists. DAWR plans to hire at least two biologists during 2001 to alleviate this problem.

3. DAWR and NMFS staff continue to work towards establishing mean fish size, percent immature, and SPR indicators for the deep and shallow bottomfishing complexes. The offshore creel census collects size information whenever possible for both shallow and deep water bottomfish catches encountered during creel surveys, and progress is being made to be able to expand for both the shallow and deep water complexes.

2000 Recommendations

1. Integrating the offshore and inshore creel census data and the fine-tuning of the offshore expansion program is ongoing. Invaluable technical assistance from NMFS has enabled DAWR to move closer towards providing statistics of confidence, mean fish size, and separating the shallow and deepwater complexes. Inputting the remaining five years (1980 to 1984) of offshore data should be completed in 2001.

2. Completing the baseline biological survey of the red-gill emperor, *Lethrinus rubrioperculatus*, remains the single most important data deficiency for the shallow water bottomfish resource for the Mariana Islands. Completion of this project is ongoing.

3. With additional funding from the WPacFIN program and technical assistance from NMFS, Guam's DAWR should establish mean fish size, percent immature, and SBB indicators for both deep and shallow water bottomfish complexes.

Table 1. Guam 2000 Expanded Offshore Creel Survey Composition Of Bottomfish Management Unit Species (BMUS)

Management Unit Species	Total Harvest*(lbs)
Lehi (*A. rutilans*)	5,280
Uku (*A. virescens*)	1,796
Jacks (*C. ignobilis, C. lugubris*)	5,889
Groupers (*C. urodeta, E. fasciatus, V. louti*)	4,893
Ehu (*E. carbunculus*)	5,316
Onaga (*E. coruscans*)	9,289
Emperors (*L. rubrioperculatus*)	13,977
Ta'ape (*L. kasmira*)	3,326
Kalekale (*P. seiboldi*)	2,298
Yellowtail Kalekale (*P. auricilla*)	8,174
Opakapaka (*P. filamentosus*)	963
Yelloweye Opakapaka (*P. flavipinnis*)	0
Gindai (*P. zonatus*)	2,650
Amberjack (*S. dumerili*)	1,578
Other Species	722
Total	**66,151**

*Bottomfishing method only

Table 2. Guam 2000 Commercial Bottomfish Average Prices

Species	Average $/lb
Amberjack	2.70
Ehu	3.99
Kalekale	3.39
Lehi	4.00
Onaga	4.29
Opakapaka	4.00
Uku	3.27
Gindai	3.99
Jacks	2.47
Groupers	2.41
Emperors	3.10
Misc. Bottomfish	2.96
All Bottomfish Species	**3.55**

Figure 1a. Guam harvest of all bottomfish species

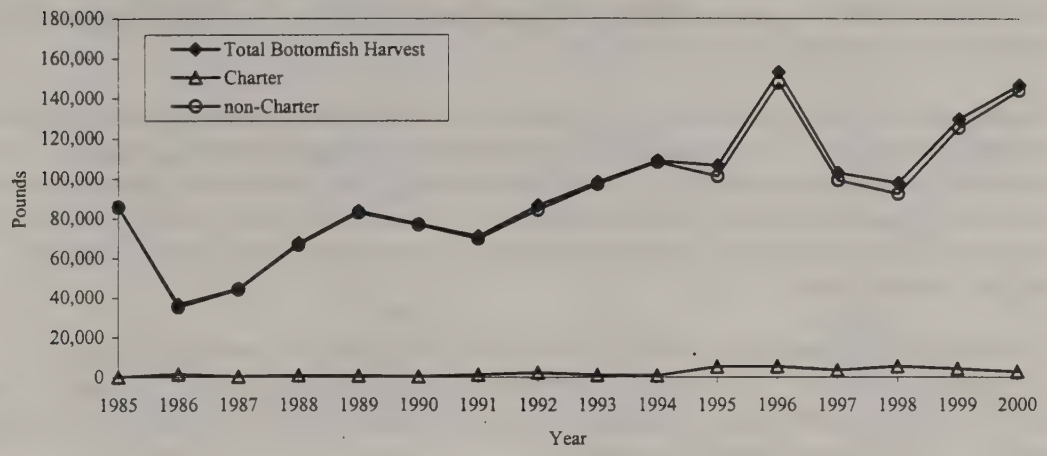
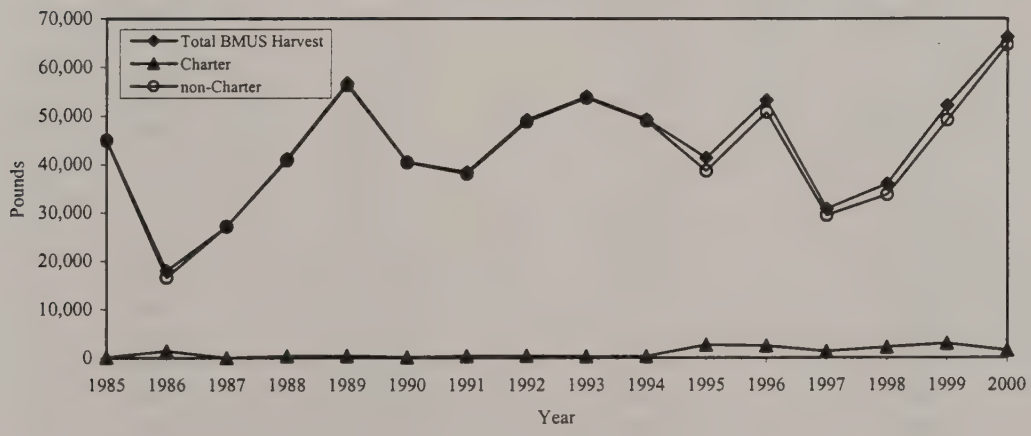


Figure 1b. Guam harvest of BMUS species



Source: The DAWR offshore creel survey data as expanded by computer-based algorithms by method of fishing. All unidentified catch was allocated to species categories based on the species percentage of the total catch.

Interpretations: Annual fluctuations of BMUS landings on Guam are usually due to highliners entering or leaving the fishery during a given year. The 1985 peak followed by the apparent crash in 1986 of BMUS harvests was the result of a few highliner fishermen who fished in 1985 and then left the fishery the following year. The decrease in the "all bottomfish" category observed in 1997

may have been caused by the elimination of the bigeye scad or atulai, *Selar crumenopthalmus*, as part of the bottomfish catch in the 1997 expansion. The inclusion of this fish in previous bottomfish expansions, especially during a bumper harvest year such as 1996, likely had the effect of inflating bottomfish catch totals.

The increase in total bottomfish and total BMUS in 1999 was due to fishermen concentrating on the deepwater complex. The significant increase in onaga landings in 1999 was due to a single fisherman fishing that complex. In 2000, an increase in BMUS landings was due to significant increases in lehi, the red-gilled emperor, the yellowtail kalikali, and jacks landings (280%, 180%, 200%, and 256% respectively). This may be due to fishermen fishing the boundary between shallow and deep water.

The harvest of total bottomfish and BMUS from the charter sector, however, decreased significantly in 2000, 38% and 49% respectively. These boats tend to release a majority of their catch, although their catch tends to be juvenile goatfish and triggerfish. The charter boats in Agat made up 87% of charter bottomfishing trips.

Year	Total Bottomfish Harvest (lbs)	Non-charter Harvest (lbs)	Charter Harvest (lbs)
85	86,035	85,848	188
86	36,839	35,363	1,475
87	44,829	44,371	458
88	67,777	66,846	931
89	83,924	83,077	848
90	77,367	76,984	384
91	71,216	69,970	1,246
92	86,911	84,577	2,334
93	98,387	97,338	1,049
94	109,050	108,295	755
95	106,436	101,127	5,309
96	153,123	147,721	5,402
97	102,699	99,100	3,599
98	97,779	92,338	5,441
99	129,419	125,088	4,330
00	**146,481**	**143,808**	**2,673**
Average	93,642	91,366	2,274
Std. deviation	32,017	30,873	1,930

Year	Total BMUS Harvest (lbs)	Non-charter BMUS Harvest (lbs)	Charter BMUS Harvest (lbs)
85	45,066	44,923	143
86	18,034	16,593	1,442
87	27,134	27,134	0
88	41,148	40,776	372
89	56,751	56,301	451
90	40,477	40,329	148
91	38,347	38,003	345
92	49,555	49,003	552
93	53,974	53,654	320
94	49,301	48,998	304
95	41,163	38,615	2,548
96	52,920	50,450	2,470
97	30,744	29,424	1,320
98	35,868	33,669	2,199
99	52,022	49,060	2,962
00	**66,151**	**64,650**	**1,501**
Average	42,330	42,588	1,067
Std. deviation	11,146	12,112	1,015

Figure 2a. Total and commercial BMUS harvest

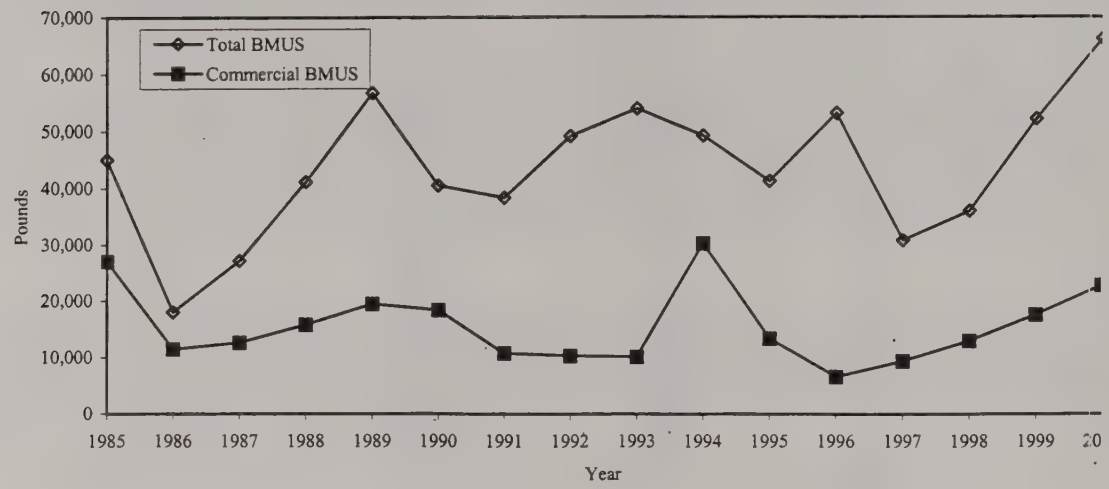
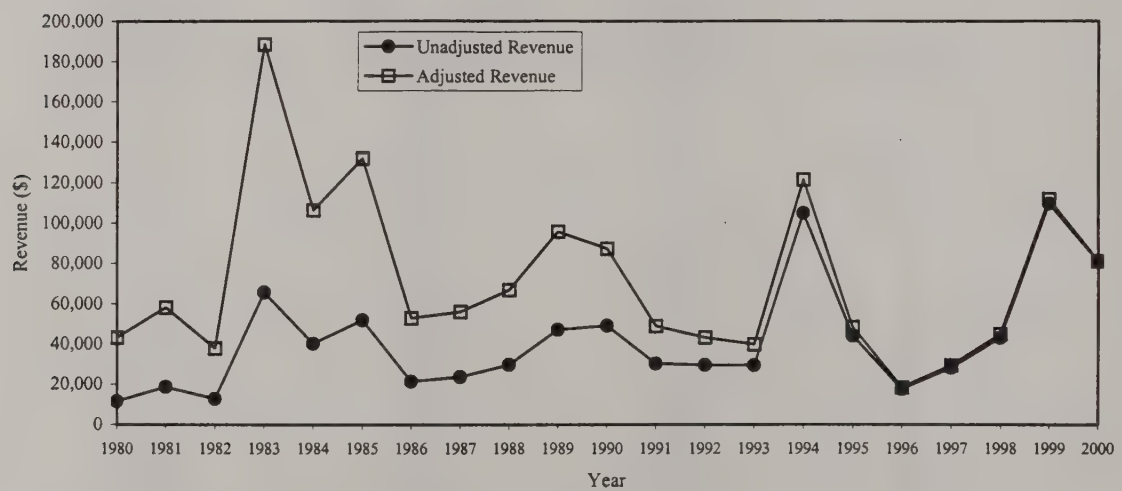


Figure 2b. Total and commercial BMUS revenue



Source: The estimated total landings are from the DAWR creel survey system, and the commercial data are from the WPacFIN-originated commercial landings system.

Calculations: The total commercial bottomfish landings and revenue for each year were calculated by summing the weight and value fields in the commercial landings database and then multiplying by an estimated percent coverage expansion factor. This annual expansion factor was subjectively created and includes an analysis of the "disposition of catch" data available from the DAWR offshore creel survey, an evaluation of the fishermen in the fishery and their entry and exit patterns,

general dockside knowledge of the fishery, status of marketing conditions and its structure, overall number of records in the data base, and a measure of best educated guesses.

Interpretations: Highliners have generally been responsible for the peaks in the commercial BMUS landings, as was the case in 1983, 1985, 1994, 1998, and 1999. The nearly 300% increase in 1994 of the commercial BMUS harvest and revenue compared with 1993 is the result of highliner vessels entering into the fishery during that year. The 39% reduction in BMUS harvest and 56% decline in commercial harvest for 1995 are best explained by the absence or reduced effort of about six highliners who combined, have landed an average of 18% of the total BMUS harvests between 1992 and 1996, and 68% of the unexpanded commercial landings for the same period. Harvest records for these six highliners indicate a 45% reduction in 1995 of their total bottomfish harvest, dropping from 13,349 pounds in 1994, down to 6,023 pounds in 1995. This decline in highliner landings accounts for about two-thirds of the 1995 reduction in commercial BMUS harvest.

The peak in 1996 followed by a 46% decline the following year in total BMUS harvest is believed to have been influenced more by weather conditions than any other factor: there were more calm water days in 1996 than in 1997. Favorable weather conditions were also observed during 1999 and 2000.

In 1996, the commercial BMUS harvest and adjusted revenue dropped to its lowest point ever, partially due to almost a complete absence of highliner activity that year. The slight increase in 1997 is attributed to a single highliner making several recorded trips to "Bank A," a rarely fished bank located 117 miles west of Guam. The increase in 1999 is likely the result of several highliners in the fishery, as well as an overall increase in participation and effort. A 25% decrease in revenue was observed in 2000.

Year	Total BMUS Harvest (lbs)	Commercial BMUS Harvest (lbs)	Unadjusted Revenue ($)	Adjusted Revenue ($)
1980		9,381	11,458	41,559
1981		10,459	18,590	55,974
1982		6,617	12,753	36,525
1983		36,281	65,543	181,422
1984		20,115	40,176	102,289
1985	45,066	27,064	51,777	126,904
1986	18,034	11,482	21,289	50,794
1987	27,135	12,639	23,551	53,815
1988	41,148	15,792	29,568	64,222
1989	56,741	19,442	47,029	92,082
1990	40,485	18,390	48,983	83,957
1991	38,343	10,773	30,234	47,013
1992	49,169	10,344	29,410	41,527
1993	53,974	10,125	29,348	38,241
1994	49,235	30,237	104,827	116,882
1995	41,243	13,339	43,929	46,476
1996	53,133	6,578	17,492	17,632
1997	30,738	9,387	28,070	28,266
1998	35,868	13,011	42,966	43,009
1999	52,022	17,621	108,165	108,165
2000	**66,151**	**22,775**	**80,947**	**80,947**
Average	43,655	15,562	42,195	69,414
Std. deviation	12,150	6,644	27,463	40,031

Figure 3a. Estimated bottomfish boat hours

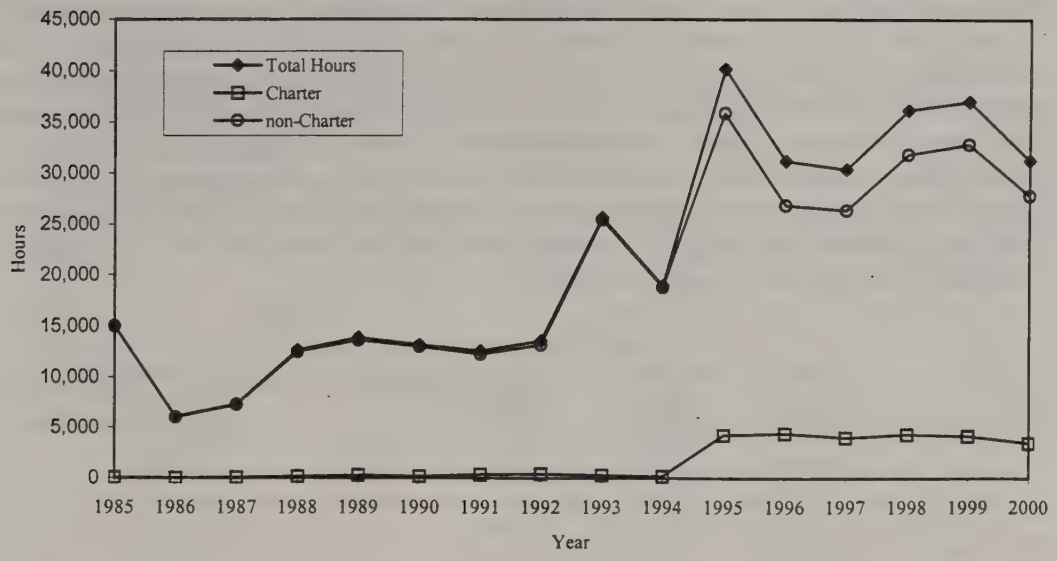
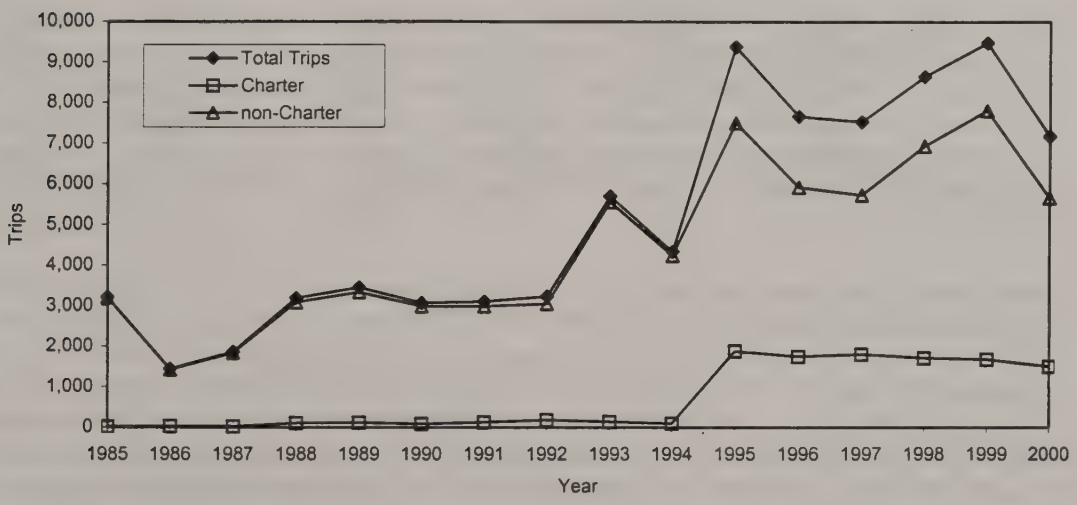


Figure 3b. Estimated bottomfish trips



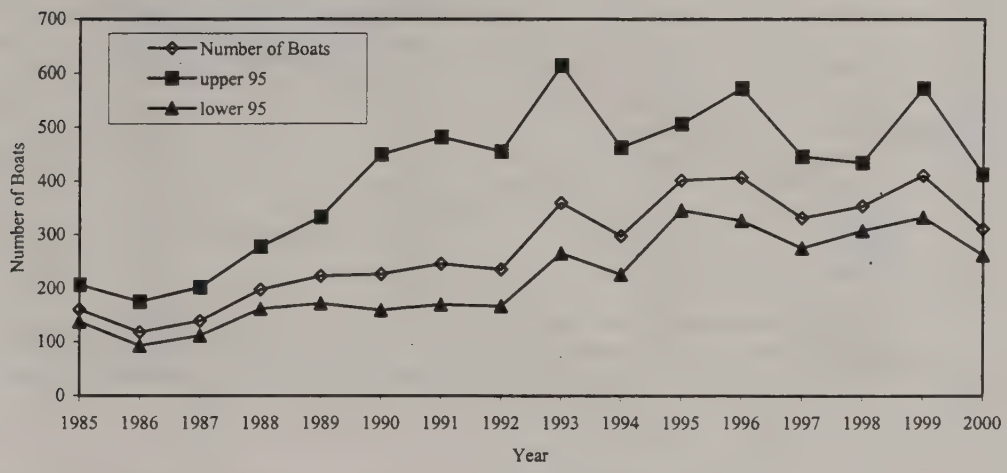
Source: The DAWR creel survey data for bottomfishing method.

Interpretations: The almost threefold increase in boating hours and doubling of bottomfish trips in 1995 could be due to the 60% increase in the number of boats entering the fishery that year. Also, a significant number of calm days that year encouraged more bottomfishing activity than previous years. The increase in boat trips and hours may have also been due to adding the Agat Marina into the offshore survey in 1994, which served to improve the estimation of the number of

recreational/subsistence and charter boats bottomfishing out of this port. That year, the charter boat component of the bottomfish fishery in 1996 accounted for 23% of the total number of bottomfishing trips, and 13% of the hours fished. This increase may have been done to the Agat Marina creel survey, which includes several charter bottomfishing vessels that make multiple trips on each survey day. The number of charter trips decreased after 1997, possibly due to tourists participating in less expensive types of recreation. The slight declines in bottomfishing trips and hours in 1996 and 1997 were due to a number of typhoons that hit Guam those years. A return to more normal weather patterns in 1999 best explains the increases last year. The decreases in boating hours and trips observed in 2000 could be due to fishermen dropping out of the fishery due to poor catches in the shallow bottom complex. An increase in overall harvest despite a decrease in effort may be due to the remaining fishermen fishing the deep water complex or fishing the boundary between deep and shallow water.

Year	Total Hours	Non-charter hours	Charter hours	Total Trips	Non-charter trips	Charter trips
85	15,037	14,989	48	3,212	3,201	11
86	6,058	6,033	25	1,444	1,422	23
87	7,313	7,264	49	1,857	1,835	22
88	12,611	12,435	176	3,190	3,085	105
89	13,910	13,615	295	3,452	3,338	114
90	13,143	12,967	176	3,071	2,988	83
91	12,527	12,217	310	3,109	2,986	123
92	13,550	13,138	412	3,234	3,054	180
93	25,733	25,458	275	5,692	5,551	141
94	19,038	18,849	189	4,331	4,238	93
95	40,153	35,927	4,226	9,376	7,498	1,878
96	31,249	26,863	4,386	7,657	5,912	1,745
97	30,370	26,360	4,010	7,527	5,724	1,803
98	36,198	31,822	4,376	8,636	6,924	1,712
99	37,019	32,860	4,159	9,479	7,804	1,675
00	**31,216**	**27,760**	**3,457**	**7,159**	**5,654**	**1,505**
Average	21,570	19,910	1,661	5,152	4,451	701
Std. deviation	11,339	9,575	1,966	2,744	2,000	820

Figure 4. Guam bottomfish fishery participation



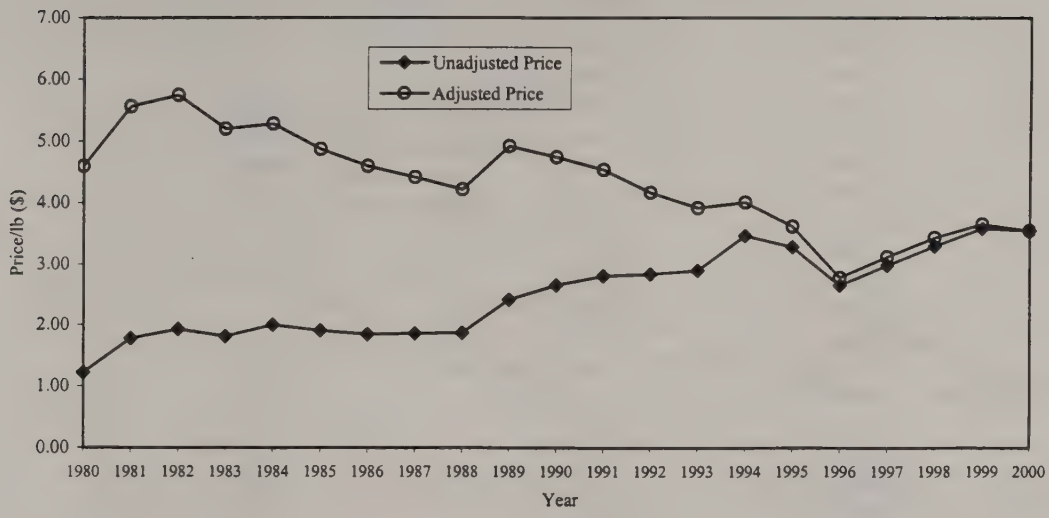
Source: Offshore creel survey boat log data from DAWR's three sampled ports. The data was converted and processed using the WPacFIN-generated boat estimator model.

Calculations: The 2000 figure was obtained by first running the above-mentioned model 1,000 times using a randomly selected order of the days sampled at all three ports combined, then eliminating the upper and lower 25 estimates to rid the model of occasional outlier estimates; and finally calculating the mean and standard deviation for the remaining 950 estimates. The removal of the outliers conducted in the second step lowered the original estimated number of boats after the model was run 1,000 times by about 1%, but more important, reduced the standard deviation by approximately 20%.

Interpretations: The number of boats participating in this fishery has leveled off in recent years, but may increase due to a better weather conditions. The 57% increase in participation from 1992 and 1993 could be due to the inclusion of the Merizo Pier as a survey site in 1991, as well as a healthy economy that made it possible for more residents to afford boats. Another 57% increase occurred in 1995 over the previous year could be due to the inclusion of the Agat Marina as an offshore creel survey site in October 1994. In general, most of the newcomers in the last five years are recreational and subsistence-type vessels who bottomfish only part-time and primarily target the shallow-water bottomfish complex. A decrease in 2000 may have been due to boats dropping out of the fishery due to low catches in the shallow bottomfishing complex.

Year	Lower95	Number of Boats	Upper95
1985	138	161	207
1986	93	118	175
1987	112	139	202
1988	162	198	278
1989	172	223	333
1990	159	226	450
1991	170	246	482
1992	167	236	456
1993	266	360	615
1994	226	298	463
1995	346	402	507
1996	327	408	573
1997	276	332	447
1998	308	354	435
1999	333	411	573
2000	**263**	**312**	**413**
Average	220	277	413
Std.deviation	83	97	137

Figure 5. Average bottomfish prices



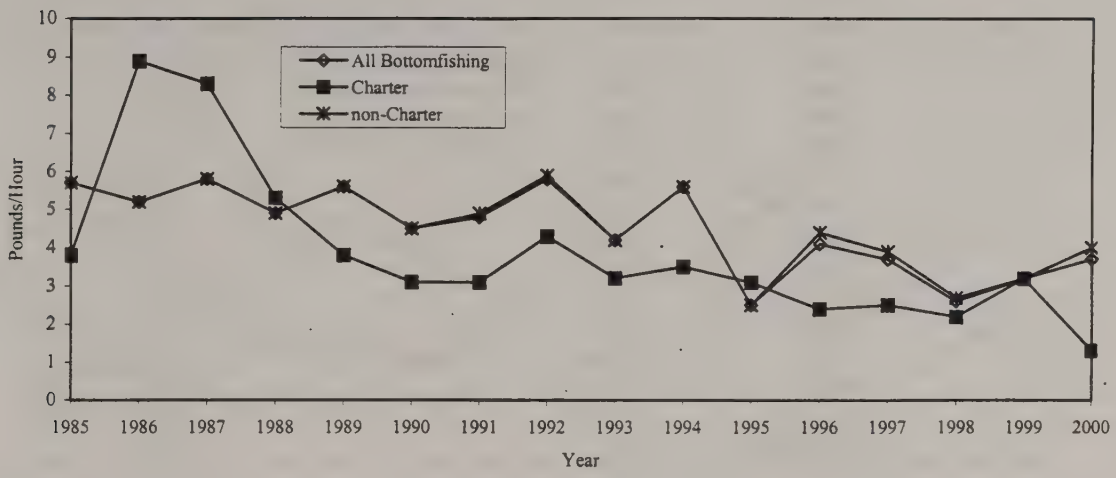
Source: The commercial landings data from the major wholesalers.

Calculations: The average price of all bottomfish species combined is calculated by dividing the total bottomfish revenue by the sold weight. The inflation adjustment is made by using the Consumer Price Index (CPI) for Guam and establishing the 1998 figure as the base from which to calculate expansion factors for all previous years (e.g. divide the 1998 CPI by the CPI for any given year), and then multiplying the unadjusted average price by this factor to obtain the adjusted average price for the given year. A new "market basket" was created by the Department of Commerce in 1998, which resulted in the CPI figure being reset in 1999. The CPI for Guam did not change for 2000.

Interpretations: The decreases in adjusted fish prices observed prior to 1996 may have been the result of a consistent supply of reasonably-priced fish and competition among vendors during those years. Roadside vendors importing fish from other islands did compete with and may have discouraged local vendors from increasing the price of locally caught bottomfish. These roadside vendors were shut down by the Department of Public Health due to health concerns, which resulted in the rise of bottomfish prices. The adjusted average price for bottomfish has been increasing slightly from 1996 to 1999, and could likely have been the result of increased demand for a dwindling supply of locally caught fish. A slight decrease in fish prices occurred in 2000.

Year	Unadjusted Price $/lb	Adjusted Price $/lb
1980	1.22	4.43
1981	1.78	5.35
1982	1.93	5.52
1983	1.81	5.00
1984	2.00	5.09
1985	1.91	4.69
1986	1.85	4.42
1987	1.86	4.26
1988	1.87	4.07
1989	2.42	4.74
1990	2.66	4.57
1991	2.81	4.36
1992	2.84	4.01
1993	2.90	3.78
1994	3.47	3.87
1995	3.29	3.48
1996	2.66	2.68
1997	2.99	3.01
1998	3.30	3.31
1999	3.61	3.61
2000	**3.50**	**3.55**
Average	2.51	4.18
Std.deviation	0.70	0.76

Figure 6. Guam bottomfish CPUE



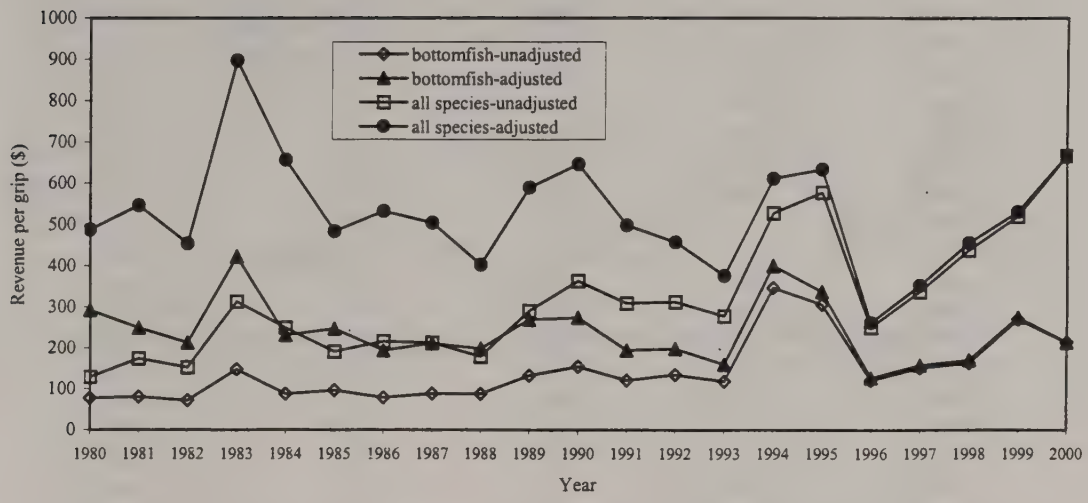
Source: The DAWR creel survey data for the bottom fishing method.

Interpretations: Prior to 1999, the CPUE for bottomfishing was reported as a single value representing both the charter and non-charter sectors. Because of yellow light situations in 1995 and 1998, the bottomfish expansion was divided into charter and non charter components. This resulted in a more accurate assessment of overall bottomfish CPUE.

Historically, the CPUE has fluctuated around 4-6 pounds per hour and has, up until the last five years, remained fairly stable. In 1995 and 1998, the overall and non-charter CPUE fell below 2.8 pounds per hour, owing in large part to an increasing number of recreational and subsistence-type vessels continuing to enter into the fishery; most of which target the less-productive shallow-water bottomfish complex. Both 1995 and 1998 CPUE figures were less than a half of the aggregate CPUE average of 5.6 pounds per hour for the first three years reported using the new expansion system, placing the fishery in yellow light conditions those years. This indicates stress on the fishery, despite the rise in CPUE in 1999 and 2000. The rise in CPUE may have been due to fishermen either leaving the fishery or fishing both shallow and deep water complexes. In 2000, Guam began enforcing its marine preserves, hopefully to ease fishing pressure on fish stocks.

	Catch per Unit Effort (lbs/hr)		
Year	**All Bottomfishing**	**Non-charter**	**Charter**
1985	5.7	5.7	3.8
1986	5.2	5.2	8.9
1987	5.8	5.8	8.3
1988	4.9	4.9	5.3
1989	5.6	5.6	3.8
1990	4.5	4.5	3.1
1991	4.8	4.9	3.1
1992	5.8	5.9	4.3
1993	4.2	4.2	3.2
1994	5.6	5.6	3.5
1995	2.5	2.5	3.1
1996	4.1	4.4	2.4
1997	3.7	3.9	2.5
1998	2.6	2.7	2.2
1999	3.2	3.2	3.2
2000	**3.7**	**4.0**	**1.3**
Average	4.5	4.6	3.9
Std.deviation	1.1	1.1	2.1

Figure 7. Guam average revenue per trip



Source: The commercial landings data from major wholesalers.

Calculations: The average revenue per trip for all species is calculated by summing the revenue of all species sold for any trip that landed bottomfish species, and dividing by the number of trips. The average bottomfish revenue per trips is calculated from those same trips by summing the sales of only bottomfish species and dividing by the number of trips.

Interpretations: The inflation-adjusted average revenue per trip for the "bottomfish" category decreased, while revenues for the "all species" categories increased in 2000. Previous drops in revenue were due to some of the more experienced fishermen not selling their catch to vendors participating in the DAWR commercial receipt book program. The increase in the amount of imported bottomfish from around Micronesia (Belau, Chuuk, Pohnpei, Kosrae, etc.) that began sometime around 1991 with the addition of frequent airline routes to Guam, may explain the slight decrease in revenues between 1991 and 1993. Roadside vendors have, for the most part, been shut down, and most local vendors prefer purchasing locally caught fish. The substantial increases in the inflation-adjusted average revenue per trip in 1994 are best explained by the success of a few highliner vessels during that year. The general higher revenue levels for the "all species" category over the last decade suggests that most commercial fishermen on average continue to make more money from selling other fish than bottomfish.

Year	$/Trip, Unadjusted Bottomfish	$/Trip, Adjusted Bottomfish	$/Trip, Unadjusted All Species	$/Trip, Adjusted All Species
1980	77	281	129	468
1981	80	239	174	525
1982	71	204	152	436
1983	147	406	312	863
1984	87	222	248	632
1985	96	236	190	465
1986	78	186	215	512
1987	88	202	212	485
1988	87	190	178	387
1989	132	258	290	567
1990	154	263	363	623
1991	120	186	308	480
1992	134	190	311	439
1993	118	153	277	361
1994	346	385	528	589
1995	306	324	578	611
1996	121	122	250	252
1997	151	152	338	340
1998	163	163	439	440
1999	266	266	522	522
2000	**213**	**213**	**668**	**668**
Average	145	231	318	508
Std. deviation	77	73	149	132

Figure 8a. Jacks/Trevallys (*Caranx, Carangoides*): Harvest

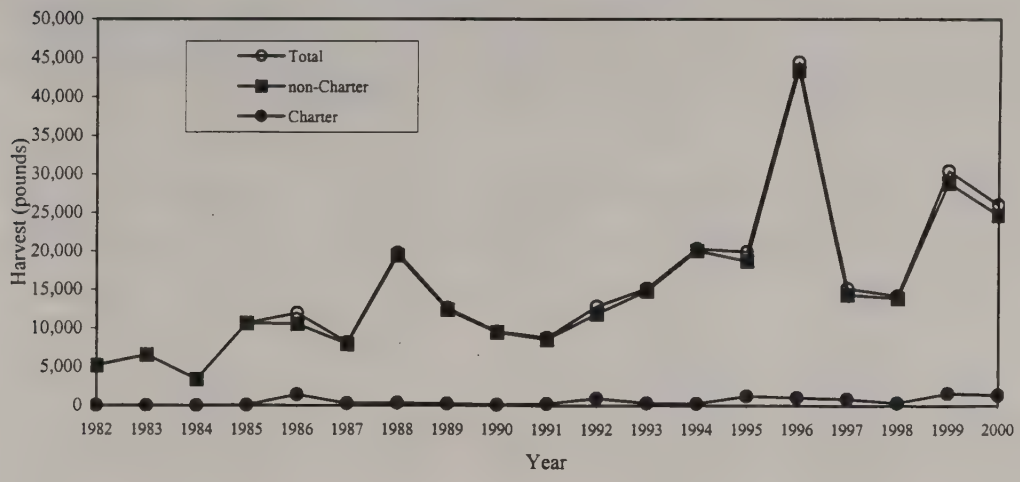
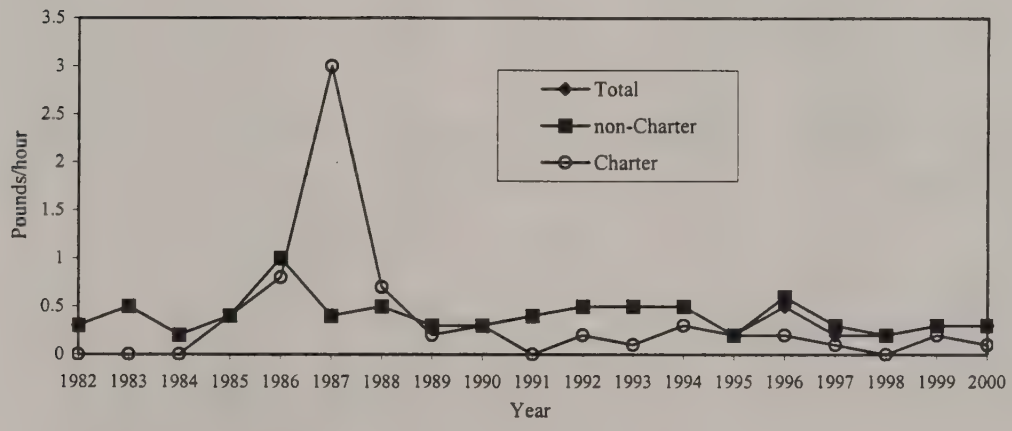


Figure 8b. Jacks/Trevallys *(Caranx, Carangoides)*: CPUE



Source: The DAWR creel survey data for the bottom fishing method.

Calculations: The yearly catch-per-unit-effort (CPUE) is calculated by using the year-end survey totals and dividing the total weight of jacks landed by the total number of hours spent bottomfishing.

Interpretations: The total and non-charter harvest of jacks decreased 14% between 1999 and 2000. The total harvest of jacks rose significantly after 1994, perhaps due to the inclusion of the Agat Marina as an offshore sampling port. Total and non-charter CPUE remained unchanged

between 1999 and 2000, but fall below the 19 year average.

The charter harvest shows extreme fluctuations prior to 1995, then with the inclusion of the Agat Marina, increased fivefold in 1995. Extreme fluctuations in charter harvest and charter CPUE is a reflection of the charter activity in Agat, which account for over 80% of bottomfish charter activity. These boats have high effort, low catches, and fish primarily in the same area over the years, and their low CPUE values in recent years may be an indication of overfishing.

Year	Harvest All Jacks	Non-charter Harvest	Charter Harvest	CPUE All Jacks	Non-charter CPUE	Charter CPUE
82	5,192	5,192	20	0.3	0.3	0
83	6,557	6,557	0	0.5	0.5	0
84	3,360	3,360	0	0.2	0.2	0
85	10,612	10,577	35	0.4	0.4	0.4
86	11,936	10,532	1,404	1.0	1.0	0.8
87	8,135	7,890	244	0.4	0.4	3.0
88	19,768	19,448	321	0.5	0.5	0.7
89	12,618	12,392	226	0.3	0.3	0.2
90	9,515	9,452	62	0.3	0.3	0.3
91	8,806	8,566	240	0.4	0.4	0
92	12,872	11,910	962	0.5	0.5	0.2
93	15,230	14,903	327	0.5	0.5	0.1
94	20,412	20,175	238	0.5	0.5	0.3
95	20,066	18,842	1,224	0.2	0.2	0.2
96	44,445	43,413	1,032	0.5	0.6	0.2
97	15,242	14,414	829	0.2	0.3	0.1
98	14,292	13,933	359	0.2	0.2	0
99	30,485	28,919	1,566	0.3	0.3	0.2
00	**26,095**	**24,753**	**1,342**	**0.3**	**0.3**	**0.1**
Average	17,533	16,882	661	0.4	0.4	0.4
Std. deviation	9,522	9,241	529	0.2	0.2	0.7

Figure 9a. Snappers (*Lutjanus, Pristipomoides, Aphareus, Etelis*): Harvest

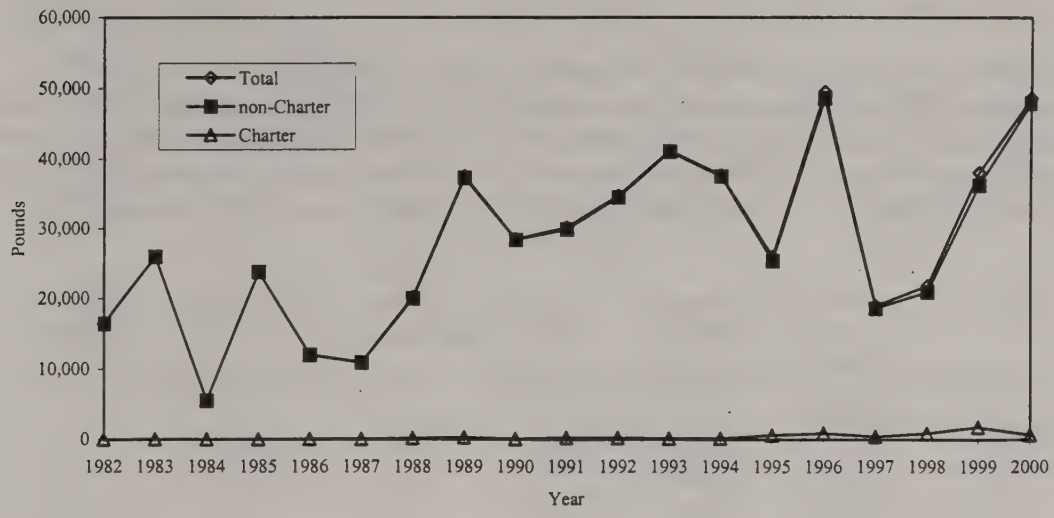
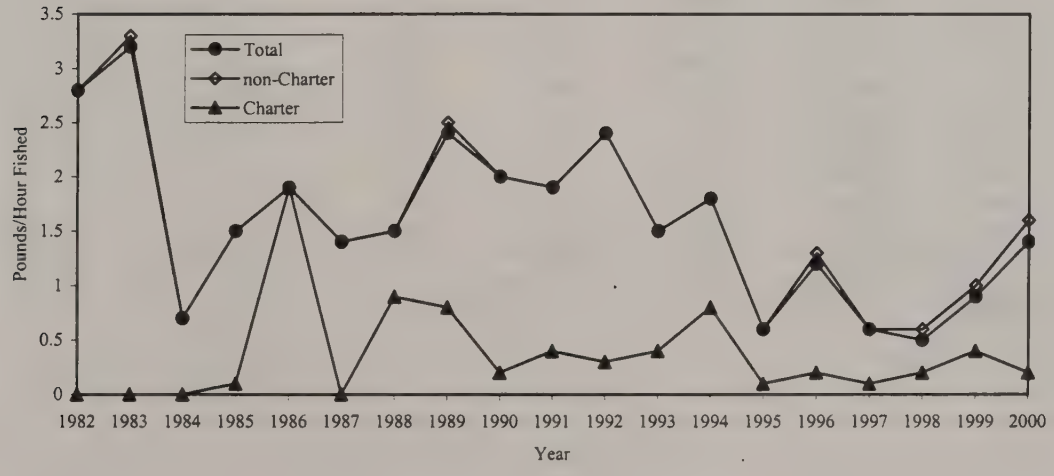


Figure 9b. Snappers *(Lutjanus, Pristipomoides, Aphareus, Etelis)*: CPUE



Source: The DAWR creel survey data for the bottom fishing method.

Calculations: The yearly catch-per-unit-effort (CPUE) is calculated by using the year-end survey totals and dividing the total weight of snappers landed by the total number of hours spent bottomfishing.

Interpretations: The total and non-charter harvest of snappers increased 28% and 32% respectively between 1999 and 2000, while the CPUE for total and non-charter activity increased

56% and 60% respectively. The overall harvest of snappers appears to be increasing over time, while CPUE appears to show a decreasing trend. Since the harvest of snappers also includes deepwater species, the fluctuations in harvest could be due to highliners targeting deepwater snapper species.

A significant increase in the harvest of snappers is observed with the charter sector after the inclusion of the Agat Marina as an offshore sampling port. Low catches and high effort, however, have resulted in extremely low CPUE values after 1994. This is a reflection of the Agat charters, which account for over 80% of the total annual charter bottomfish trips. Between 1999 and 2000, the harvest of snappers by charter boats decreased 63%, while charter CPUE decreased 50%.

Year	Harvest All Snappers	Non-charter Harvest	Charter Harvest	CPUE All Snappers	Non-charter CPUE	Charter CPUE
82	16,453	16,453	0	2.8	2.8	0.0
83	25,945	25,945	0	3.2	3.3	0.0
84	5,475	5,475	0	0.7	0.7	0.0
85	23,803	23,799	4	1.5	1.5	0.1
86	12,029	11,983	46	1.9	1.9	1.9
87	10,853	10,853	0	1.4	1.4	0.0
88	20,214	20,054	161	1.5	1.5	0.9
89	37,612	37,375	237	2.4	2.5	0.8
90	28,550	28,507	44	2.0	2.0	0.2
91	30,287	30,048	239	1.9	1.9	0.4
92	34,804	34,627	177	2.4	2.4	0.3
93	41,236	41,116	120	1.5	1.5	0.4
94	37,801	37,649	153	1.8	1.8	0.8
95	26,118	25,516	602	0.6	0.6	0.1
96	49,535	48,654	880	1.2	1.3	0.2
97	19,093	18,707	386	0.6	0.6	0.1
98	21,985	21,110	875	0.5	0.6	0.2
99	38,093	36,329	1,765	0.9	1.0	0.4
00	**48,573**	**47,921**	**652**	**1.4**	**1.6**	**0.2**
Average	30,037	29,641	396	1.5	1.5	0.4
Std. deviation	11,788	11,612	468	0.6	0.6	0.5

Figure 10a. Groupers (*Epinephelus, Cephalopholis, Variola*): Harvest

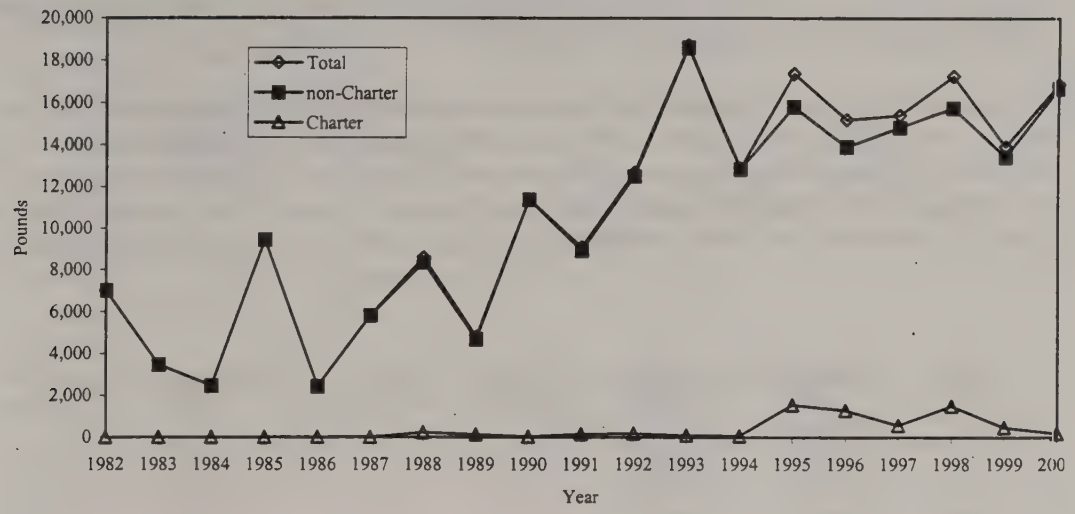
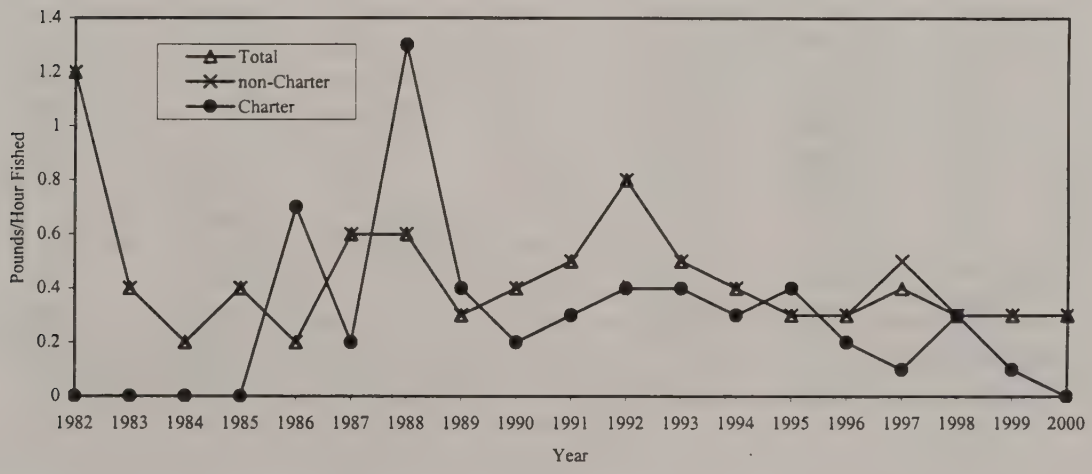


Figure 10b. Groupers *(Epinephelus, Cephalopholis, Variola)*: CPUE



Source: The DAWR creel survey data for the bottom fishing method.

Calculations: The yearly catch-per-unit-effort (CPUE) is calculated by using the year-end survey totals and dividing the total weight of groupers landed by the total number of hours spent bottomfishing.

Interpretations: The total and non-charter harvest of groupers increased 21% and 24% respectively between 1999 and 2000. The CPUE for total and non-charter harvest of snappers

remained the same between 1999 and 2000, but falls below the 19 year average. The inclusion of Agat as an offshore sampling port did not appear to increase the harvest of groupers, but the harvest of groupers appears to be, on average, higher than years prior to 1994. The overall harvest of groupers appears to be leveling off since 1992, while CPUE appears to show a decreasing trend. This could be due to the harvest of smaller groupers.

The harvest of groupers by charter boats increased significantly with the inclusion of the Agat Marina as an offshore sampling port. CPUE for charter boats, however, decreased. Between 1999 and 2000, the charter harvest of groupers decreased 62% while the CPUE decreased to nearly zero. This trend is a reflection of the Agat charters, which account for over 80% of charter activity on Guam. These charter boats have low catches, high effort, and fish in the same general area.

Year	Harvest All Groupers	Non-charter Harvest	Charter Harvest	CPUE All Groupers	Non-charter CPUE	Charter CPUE
82	7,009	7,009	0	1.2	1.2	0.0
83	3,471	3,471	0	0.4	0.4	0.0
84	2,463	2,463	0	0.2	0.2	0.0
85	9,450	9,450	0	0.4	0.4	0.0
86	2,442	2,425	17	0.2	0.2	0.7
87	5,823	5,814	9	0.6	0.6	0.2
88	8,594	8,359	236	0.6	0.6	1.3
89	4,805	4,678	127	0.3	0.3	0.4
90	11,415	11,387	28	0.4	0.4	0.2
91	9,094	8,936	158	0.5	0.5	0.3
92	12.8-7	12,532	175	0.8	0.8	0.4
93	18,704	18,607	97	0.5	0.5	0.4
94	12,909	12,852	57	0.4	0.4	0.3
95	17,369	15,825	1,543	0.3	0.3	0.4
96	15,208	13,920	1,289	0.3	0.3	0.2
97	15,420	14,847	573	0.4	0.5	0.1
98	17,250	15,757	1,493	0.3	0.3	0.3
99	13,921	13,437	484	0.3	0.3	0.1
00	**16,846**	**16,663**	**183**	**0.3**	**0.3**	**0.0**
Average	11,997	11,593	404	0.4	0.4	0.3
Std. deviation	4,899	4,615	541	0.2	0.2	0.3

Figure 11a. Emperors (*Lethrinus, Gnathodentex, Gymnocranius, Montaxis*): Harvest

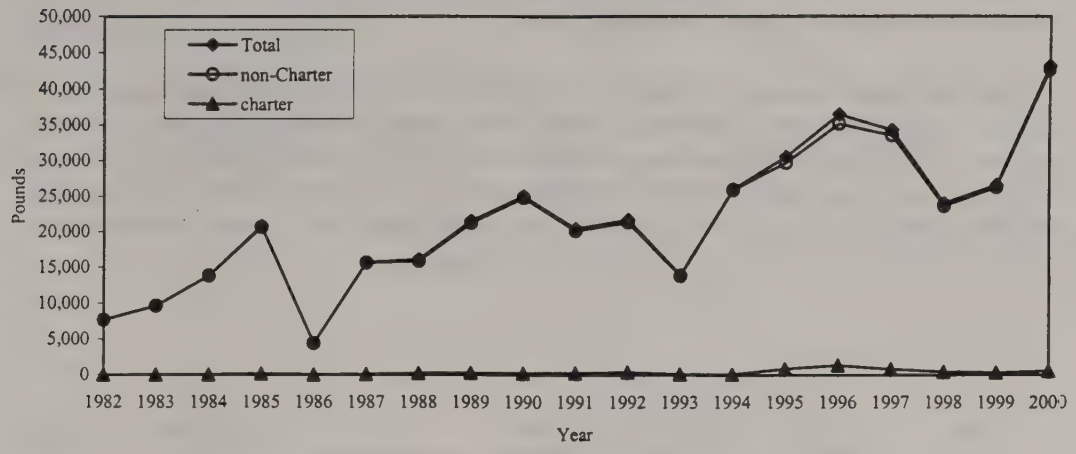
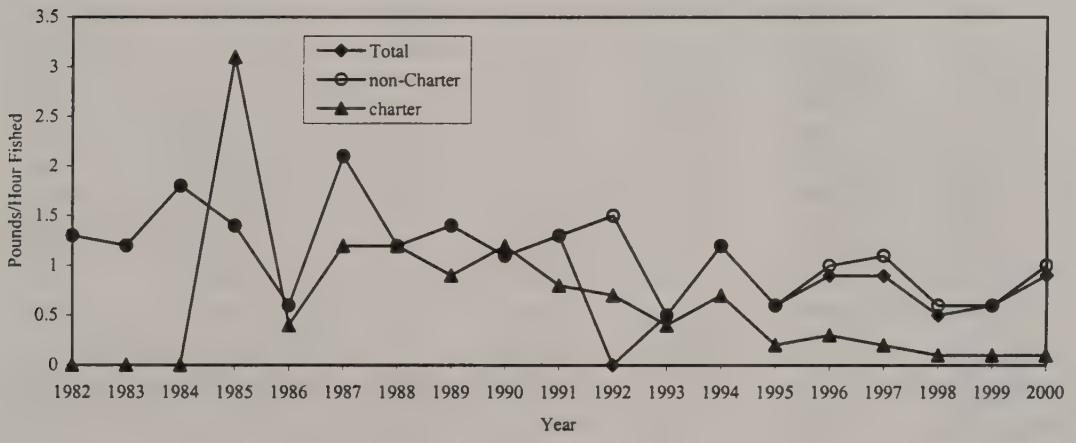


Figure 11b. Emperors *(Lethrinus, Gnathodentex, Gymnocranius, Monotaxis)*: CPUE



Source: The DAWR creel survey data for the bottom fishing method.

Calculations: The yearly catch-per-unit-effort (CPUE) is calculated by using the year-end survey totals and dividing the total weight of bottomfish landed by the total number of hours spent bottomfishing.

Interpretations: The total and non-charter harvest of emperors both increased 62% between 1999 and 2000. The CPUE for total and non-charter harvest of snappers increased 50% and 67%

respectively between 1999 and 2000, but falls below the 19-year average. The increased in the harvest of emperors in both the charter and non-charter sectors may have be due to the addition of the Agat Marina as an offshore sampling port. The CPUE, however, for emperors decreased 50% between 1994 and 1995. The overall harvest of emperors appears to be increasing since 1982, while CPUE appears to show a decreasing trend.

The harvest of emperors by the charter sector increased significantly with the inclusion of the Agat charters in 1995. However, harvest by charter boats appear to be decreasing after an initial increase. Since the Agat charters make up to 80% of bottomfish charter activity, their low catches, high effort, and tendency to fish in the same general area may have resulted in low emperor catches. Currently, emperors are rarely observed with charter boats, perhaps indicative of overfishing by charter boats in their designated fishing areas.

Year	Harvest All Emperors	Non-charter Harvest	Charter Harvest	CPUE All Emperors	Non-charter CPUE	Charter CPUE
82	7,677	7,677	0	1.3	1.3	0.0
83	9,635	9,635	0	1.2	1.2	0.0
84	13,843	13,843	0	1.8	1.8	0.0
85	20,841	20,691	149	1.4	1.4	3.1
86	4,402	4,393	9	0.6	0.6	0.4
87	15,706	15,648	58	2.1	2.1	1.2
88	16,123	15,909	215	1.2	1.2	1.2
89	21.557	21,300	257	1.4	1.4	0.9
90	25,017	24,797	220	1.1	1.1	1.2
91	20,433	20,177	256	1.3	1.3	0.8
92	21,735	21,349	385	1.5	1.5	0.7
93	13,942	13,821	121	0.5	0.5	0.4
94	25,980	25,857	122	1.2	1.2	0.7
95	30,475	29,635	840	0.6	0.6	0.2
96	36,476	35,145	1,331	0.9	1.0	0.3
97	34,286	33,516	770	0.9	1.1	0.2
98	24,060	23,621	439	0.5	0.6	0.1
99	26,648	26,327	321	0.6	0.6	0.1
00	**43,103**	**42,607**	**496**	**0.9**	**1.0**	**0.1**
Average	23,799	23,425	374	1.0	1.1	0.7
Std. deviation	9,415	9,166	346	0.4	0.4	0.8

Fisheries Section, DAWR
Department of Agriculture, Guam

Offshore Survey Boat Log

Interviewer Start Time End Time
AM: / /
PM: / /

Date ____/____/____
Location ____
Type Day (1:WD, 2:WE) ____

Log No	Int. No.	Depart Time	Return Time	Boat No. (or Name)	Fish? (Y/N/U)	Charter? (Y/N/U)	Type of Activity	Vehicle License No.	Remarks
1									
2									
3									
4									
5									
6									
7									
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31									
32									

Fisheries Section
Division of Aquatic and Wildlife Resources
Department of Agriculture, Guam

Date _____ 1 WD/2 WE Interview #_____

OFFSHORE CREEL CENSUS FORM

Interviewer _____

Landing_____ Interview Time _____

Boat #_____ Charter? (y/n/u)____Berthed (y/n/u) _____Towing Vehicle's License #_____

Method	Gear Units	Hours fished	Area Fished
1. Trolling	_____	_____	_____
2. Bottom (s,d,m)	_____	_____	_____
3. Atulai night jigging	_____	_____	_____
4. Snorkel Spearfishing	_____	_____	_____
5. Scuba Spearfishing	_____	_____	_____
6. Other_____	_____	_____	_____
7. Other_____	_____	_____	_____

No. of people on board _____
No. of guests (charter only)_____

Weather _____Cloud cover_____
Wind Direction _____Speed_____
Tropical Storm/Typhoon condition_____
Warnings: Small craft _____ (y,n,u)
High Surf _____(y,n,u)

Species/Code	Length (mm)	Wt. (kg)	Length (mm)	Wt. (kg	Length (mm)	Wt. (kg)	Length (mm)	Wt. (kg)	Total Actual	Weight Calc.	Est.

Bycatch: Did you release or throw back any fish? ( ) NO ( ) Yes (if yes, list below)

Species/Code	Method	Check Released dead	One Released Alive	Length (mm)	Wt. (kg)	Length (mm)	Wt. (kg)	Total Act.	Number Est.	Total Actual	Weight Calc.	E

Catch Disposition

Method	%kept	%sold	Buyer

REMARKS:

Appendix 3

Hawaii

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Summary

In 2000, none of the five BMUS species for which SPR values are calculated have archipelago-wide SPR values below the 20% critical threshold that defines recruitment overfishing under the FMP. Estimates range from a low of 27% for onaga to a high of 52% for uku and opakapaka when viewed on an archipelago-wide basis. Implementation of the state bottomfish management plan (which became law in June 1998) should bring an improvement to the locally depleted status of ehu and onaga in the MHI and thereby increase the archipelago-wide SPR estimates for these species.

The MHI bottomfish fishery, though showing signs of stress, has remained relatively stable over the last few years. Landings recorded to date for 2000 are higher than the revised landings reported for 1999. CPUE for the MHI is down slightly from last year (216 lb/trip vs 196 lb/trip). Stocks of many of the BMUS species in this zone show clear signs of stress. Each of the BMUS species evaluated has a yellow light condition due to a drop in CPUE below 50% of original values. In addition, onaga and ehu stocks are severely depleted on a local basis as the MHI SPR values for these species are at or below 20% (7% and 8% for onaga and ehu, respectively). These SPR levels are below the critical thresholds that would signify recruitment overfishing if present on a stock-wide basis and demand immediate action (state bottomfish management measures, when implemented, should meet this need). The Hapuupuu SPR value calculated for the MHI are 25% for 2000.

Bottomfish resources in the NWHI remain relatively healthy. CPUE in the Mau Zone on a per trip basis dropped slightly to 196 lbs/day in 2000 from 216 lbs/day in1999. CPUE in the Hoomalu zone increased to 5259 lbs/day in 2000 from 4605 lbs/day in 1999. On a per day basis CPUE values are down 23% in the Mau zone but up 13% in the Hoomalu. Analysis of SPR and percent immature in the catch show no localized depletion problems to date for any BMUS species in either zone. However, the mean weight of onaga in the Mau zone did drop dramatically in 1998. Mean weights of fish in the NWHI catch appear generally stable over time, with the notable exception of the onaga mean weight, where recent declines can be seen for both the Mau and the Hoomalu zone. The 1998 Mau onaga value was the lowest on record showing a sharp decline from earlier values with a return to normal levels in 1999 then another drop in 2000.

Armorhead stocks outside of the US EEZ experienced a short pulse in recruitment in 1992 which did not carry over into 1993. The 1993 SPR values at Southeast Hancock Seamount are the highest recorded since 1986, but at 2.5%, they still indicate a collapsed fishery. Data for Hancock Seamount has not been available since 1994, but is available for areas outside of the US EEZ for years through 1997 (1998 values are not yet available). SPR values obtained at Colahan Seamount have been shown to correlate well with values from Hancock Seamount and can be used as a proxy value. The 1997 SPR for Colahan Seamount was 1.1%, indicating a collapsed fishery. SPR values for armor head continue to show no signs of improvement.

Historical Annual Statistics Main Hawaiian Islands						
Year	Total Landings (lbs)	CPUE (lbs/trip)	Inflation Adjusted Revenue	Price per Pound	Number of Vessels	SPR Average
1986	810348	274	$3,347,000	$4.42	538	33
1987	783569	237	$3,640,000	$4.87	535	25
1988	1164492	329	$4,817,000	$4.35	572	37
1989	1006142	361	$4,286,000	$4.56	537	40
1990	645802	245	$2,904,000	$4.87	501	27
1991	547800	202	$2,070,000	$4.05	469	24
1992	587471	228	$2,126,000	$3.92	407	25
1993	347960	213	$1,718,000	$4.03	403	24
1994	457956	217	$1,958,000	$3.99	423	24
1995	439625	193	$1,942,000	$3.72	400	22
1996	439867	172	$1,676,000	$4.12	466	21
1997	512554	164	$1,660,000	$3.54	495	20
1998	478802	185	$1,590,000	$3.64	493	20
1999	455131	216	$1,445,000	$2.85	483	25
2000	478424	196	$1,858,000	$3.68	480	21
Ave.	610396	229	$2,469,133	$4.01	480	26
[illegible]	232697	55	$1,069,162	$0.54	54	6

Historical Annual Statistics Mau Zone						
Year	Total Landings (lbs)	CPUE (lbs/trip)	Inflation Adjusted Revenue	Price per Pound	Number of Vessels	SPR Average
1986	NA	2206	NA	NA	NA	41
1987	NA	2889	NA	NA	NA	50
1988	NA	2136	NA	NA	4	37
1989	118000	4463	$312,000	$3.66	5	91
1990	249000	3435	$635,000	$3.28	14	77
1991	103000	1199	$302,000	$3.53	14	42
1992	71000	1273	$208,000	$3.42	8	38
1993	98000	1321	$269,000	$3.06	8	36
1994	160000	1573	$513,000	$3.28	12	68
1995	166000	1635	$475,000	$2.99	10	45
1996	135000	1543	$405,000	$3.25	13	53
1997	105000	1976	$371,000	$3.57	9	61
1998	66000	1689	$210,000	$2.90	7	42
1999	54000	1808	$182,000	$3.30	7	51
2000	49000	1053	$160,000	$3.38	6	42
Ave.	114500	2013	$336,833	$3.30	9	52
Std.	57156	932	$147,464	$0.23	3	16

Historical Annual Statistics Hoomalu Zone						
Year	Total Landings (lbs)	CPUE (lbs/trip)	Inflation Adjusted Revenue	Price per Pound	Number of Vessels	SPR Average
1986	NA	5301	NA	NA	NA	75
1987	NA	8187	NA	NA	NA	113
1988	NA	4702	NA	NA	12	66
1989	184000	5481	$458,000	$3.34	5	70
1990	173000	5403	$453,000	$3.25	5	64
1991	283000	5871	$768,000	$3.15	4	82
1992	353000	9464	$1,067,000	$3.37	5	98
1993	287000	8412	$896,000	$3.35	4	109
1994	283000	6903	$972,000	$3.43	5	64
1995	202000	6130	$636,000	$3.14	5	73
1996	176000	6216	$558,000	$3.44	3	78
1997	241000	6351	$784,000	$3.25	6	65
1998	266000	5315	$839,000	$3.07	7	66
1999	269000	5611	$970,000	$3.59	6	62
2000	213000	5909	$710,000	$3.74	5	68
Ave.	244167	6350	$759,250	$3.34	6	77
	55497	1342	$202,887	$0.19	2	17

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Introduction

The commercial bottomfish stocks in the Hawaiian Islands are divided into two fisheries: seamount groundfish and deep-slope bottomfish. The seamount fishery targets alfonsin, *Beryx* spp., and armorhead, *Pseudopentaceros wheeleri*. The only area in the US EEZ for this fishery is Southeast Hancock Seamount located 1,400 nm northwest of Honolulu. This trawl fishery was started by the Russians and Japanese in the late 1960s and large catches were made for about 10 years until they caused a crash in the fishery. This fishery has never been domestically harvested. A moratorium on fishing within the US EEZ began in 1986 and continues through the present as no substantial recovery in the fishery has been observed.

The deep-slope bottomfish fishery in Hawaii concentrates on species of eteline snappers, carangids, and a single species of grouper concentrated at depths of 20-150 fathoms. These fish have been fished on a subsistence basis since ancient times and commercially for at least 90 years. The deep-slope fishing grounds within the US EEZ are divided into three management zones. The inhabited main Hawaiian Islands (MHI) support numerous subsistence, recreational, and commercial fishermen with considerable overlap by category. The uninhabited Northwestern Hawaiian Islands (NWHI) are divided into the Mau Zone, closer to the MHI, and the Hoomalu Zone. Fishing in these zones is conducted solely by commercial fishermen and requires federal licensing for such activities. The Hoomalu Zone is a limited entry zone with 5 vessels participating in 2000; 6 vessels fished the Mau Zone in the same year.

Vessel size varies considerably with larger fully commercial vessels (30 ft in length and over) conducting trips of about 10 days, and smaller vessels (<30 ft) generally restricted to the MHI and trips of 1-3 days. Most vessels in this fishery are fully outfitted with electronic navigation and fish-finding equipment, as well as with electric or hydraulic line-hauling equipment. The catch is sold fresh in the round for local consumption.

Catch and revenue data for bottomfish have been collected by the State of Hawaii Division of Aquatic Resources (HDAR) since 1948 in the form of a report submitted by commercial fishermen. No data is collected for recreational or subsistence fishermen, but their catch is estimated to be about equal to the commercial catch in the MHI. Data obtained from a market monitoring program and data from fishermen interviews are combined with the HDAR data set for most of the analysis presented in this report.

Recommendations

The Plan Team recommends:

1) The Council endorse the fishermen's recommendations regarding implementing the following mitigation measure policies and note that these are reasonable measures to reduce potential fishery interactions with monk seals:

2) Bottomfishers must stop fishing and retain all gear on deck whenever a monk seal is sighted in an area within a 10 yard radius of where fishing operations are ongoing. If the monk seal remains in this designated area for more than two hours, the Master of the vessel shall relocate to other fishing grounds where there are no monk seals.

3) Bottomfishers must retain all injured and/or dead by catch. Discard of offal shall occur after fishing operations have ceased and only if there are no monk seals in the area.

4) Annual protected species and regulatory workshops be held for all NWHI bottomfish permit holders and vessel operators, including training on monk seal life history, mitigation efforts, etc.

5) A Council staff/member be included and participate on Hawaiian Monk Seal Recovery Team.

6) Regular reporting to the Council by the Honolulu Laboratory Marine Mammal Research Program on monk seal recovery efforts, research and budget needs to assist the Council in bottomfish management decisions.

7) Given the NWHI Coral Reef Reserve will limit the number of NWHI bottomfish permits, the Council consider removing the existing landing requirements in Mau and Hoomalu Zone limited entry management programs and retain all existing permit holders. The Council also consider allowing the existing permit holders the flexibility to charter or lease their permits/vessels.

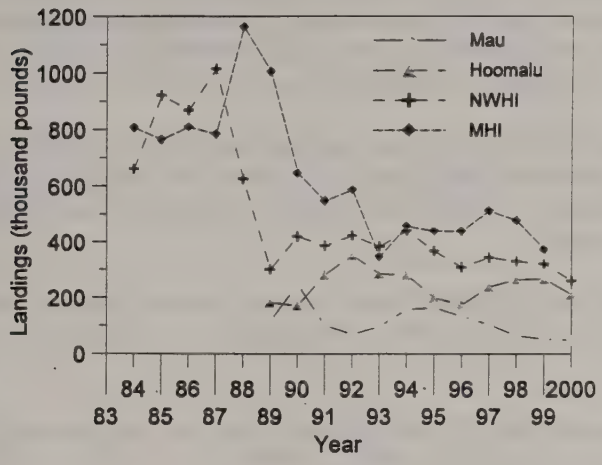
8) NMFS and the Council modify the proposed framework adjustment amendment to add new entry criteria for the Mau Zone as suggested by the previous recommendation and proceed as soon as possible with its implementation.

9) The Council be reminded that Midway-based charter fishing operations are required to obtain appropriate commercial fishing licenses and permits and report catches of pelagic and bottomfish taken outside of the Midway National Wildlife Refuge to the NMFS and the State of Hawaii.

10) Midway be used as a refueling and reprovisioning station for the NWHI bottomfish vessels.

11) A test program using video technology on bottomfish vessels be used to monitor for protected species interactions. The Team also urges the electronic collection of size frequency, incidental catch and bycatch information in the fishery if such a test program were initiated.

Figure 1. Hawaii's bottomfish landings from the NWHI and MHI



	Landings (1000 lb)			
Year	**Mau**	**Hoomalu**	**Total NWHI**	**MHI[2]**
1984	NA	NA	661	807
1985	NA	NA	922	763
1986	NA	NA	869	810
1987	NA	NA	1015	783
1988	NA	NA	625	1164
1989	118	184	303	1006
1990	249	173	421	646
1991[1]	103	283	387	548
1992[1]	71	353	424	587
1993[1]	98	287	385	348
1994[1]	160	283	443	458
1995[1]	166	202	369	440
1996[1]	135	176	311	440
1997[1]	105	241	346	513
1998[1]	66	266	332	479
1999[2]	54	269	323	455
2000[2]	**49**	**213**	**262**	**478[3]**
mean	114.50	244.17	494.00	884.12
s.d.	57.16	55.50	236.28	1028.90

[1] NWHI data from combination NMFS and HDAR [2] Data from HDAR

[3] Preliminary data not expanded for full year estimate.

Source: Data are from HDAR. Data are only those from BMUS. Pelagic species data were not

included.

Calculation: The HDAR integrated data set provides the most complete data set dealing with the effort and landings of the NWHI fishing fleet. Supplementary collection of data by both HDAR and NMFS at the Honolulu fish auction provides opportunities for the cross-checking of trip and landing information. The detailed information collected at the Honolulu auction is used for other analysis.

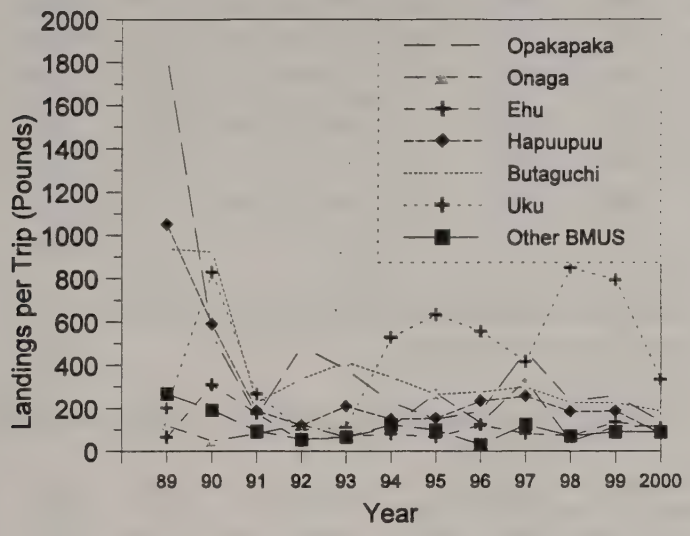
Data in this report are only from those trips that were directed at bottomfish species or in which bottomfish gear was used (zero catch trips or efforts were included). Trolling only trips to the NWHI that were not targeting BMUS are not included. Trolling only trips that resulted in BMUS being caught were included.

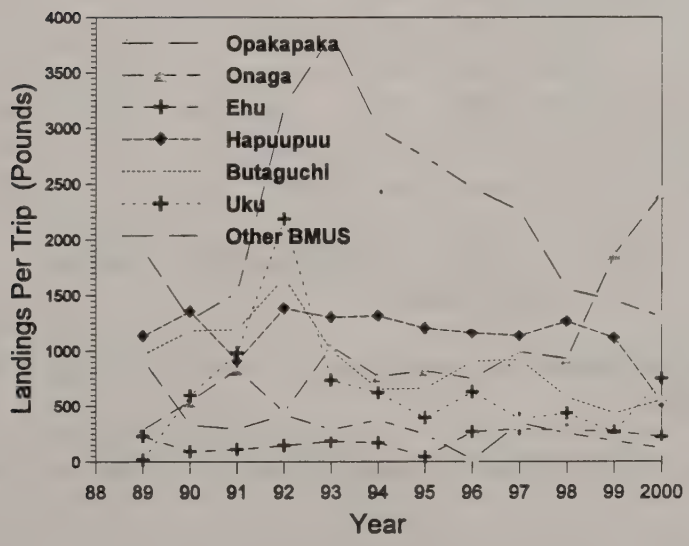
Interpretation: The 2000 NWHI BMUS landings data has decreased 19% overall. The largest decrease occurred in the Hoomalu zone where there was a 21% drop. The Mau zone landings decreased 9%.

The Hoomalu zone decrease was mainly due to a decrease in the number of trips made as the average BMUS landings per trip rose by 5%(Fig. 2). There were 2 vessels that made the minimum landings and trips required to maintain their permits.

The Mau zone decrease was mainly due to the exit of a full-time bottomfish vessel. The decline is related to the decreasing participation of full-time bottomfish operations and highlights the multi-purpose, multi-fishery type fishing operations that comprise the majority of the Mau zone participants. Mau zone vessels are now primarily part-time and combination troll/bottomfish multi-fishery vessels. There are very few if any full-time bottomfish vessels that fish for bottomfish on a full time basis in the Mau zone. Previous to 2000 an example of the effects of a full time highliner vessel entering the fishery can be seen in the landings from 1994-1997. In 1994 a full-time commercial bottomfish fisherman entered the Mau zone fishery and immediately made a large impact on the total landings for the duration of its participation through mid-1997. The same highliner vessel then entered the Hoomalu zone fishery(where the effects can also be seen as increased catch) late in 1997 whereupon it made an immediate impact on the volume of landings.

Figure 2. Northwestern Hawaiian Islands BMUS species composition of landings per trip, by weight, for the Mau and Hoomalu Zones





NWHI BMUS average pounds per trip by species, Mau Zone

Species	1991[1]	1992[1]	1993[1]	1994[1]	1995[1]	1996[2]	1997[2]	1998[2]	1999[2]	2000
Opakapaka	163	488	382	229	149	187	465	235	259	138
Onaga	83	124	66	114	270	132	331	47	115	116
Ehu	176	48	69	81	65	123	82	72	136	108
Hapuupuu	189	121	210	150	153	235	257	184	187	81
Butaguchi	228	336	415	346	264	276	300	227	227	187
Uku	266	100	112	529	635	558	417	852	796	333
Other BMUS	94	56	67	124	99	32	124	72	91	90
Total per trip	1199	1273	1321	1573	1635	1543	1976	1689	1811	1053

[1] Data from combination of NMFS and HDAR data sets.
[2] Data from HDAR data set.

NWHI BMUS average pounds per trip by species, Hoomalu Zone

Species	1991[1]	1992[1]	1993[1]	1994[1]	1995[1]	1996[2]	1997[2]	1998[2]	1999[2]	2000
Opakapaka	1530	3208	3849	2984	2741	2426	2258	1556	1454	1304
Onaga	837	450	1042	771	825	752	993	931	1872	2417
Ehu	113	148	185	172	47	272	298	285	273	225
Hapuupuu	913	1386	1305	1318	1206	1166	1141	1266	1119	535
Butaguchi	1196	1660	1004	655	665	909	923	583	439	556
Uku	985	2187	736	623	397	632	387	438	266	750
Other BMUS	297	425	291	380	249	21	351	256	188	122
Total per trip	5871	9464	8412	6903	6130	6216	6351	5315	5611	5909

[1] Data from combination of NMFS and HDAR data sets.
[2] Data from HDAR data set.

Source: The 2000 data are from HDAR. Data are only those from BMUS. Pelagic species data were not included.

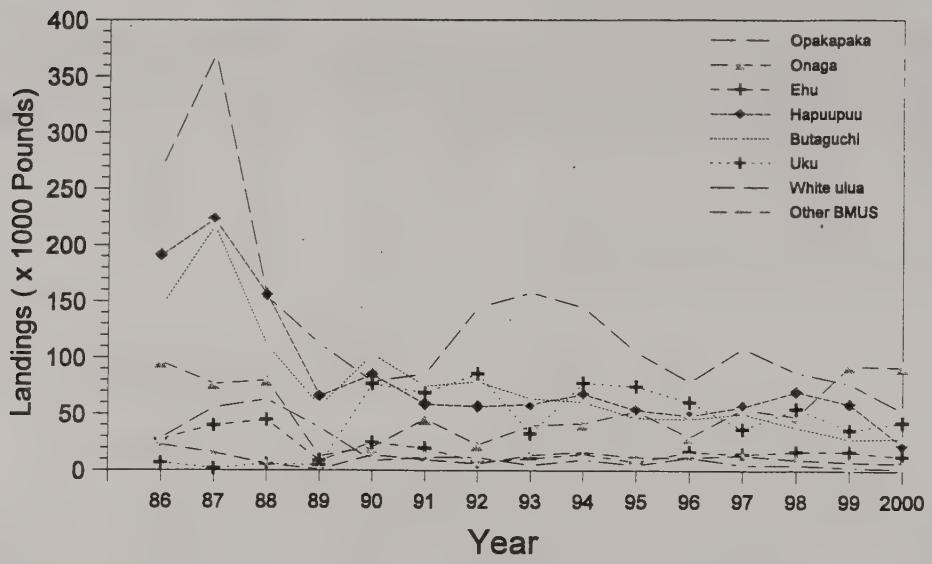
Calculation: The BMUS data were totaled by zone and divided by the number of trips to each zone.

Interpretations: The Mau zone average BMUS landings per trip has posted a large decreased of 42%. The sharp decrease is due to a couple of factors the largest being the exit of a single full-

time bottomfish vessel from the fishery. The secondary factor of the remaining fleet being mainly composed of multi-purpose/multi-target vessels which target the pelagic species as well adds to the decrease in the BMUS landings per trip. This fishing strategy gives the fishermen more options to make a successful trip taking into effect the weather and fishing conditions on a trip.

Hoomalu zone BMUS per trip landings have increased 5% in 2000(also increased by 5% in 1999). Onaga, butaguchi, and uku increased while hapuupuu landings decreased the most. Onaga average landings per trip are the highest they have been in 10 years. Uku average per trip landings are the highest they have been since 1993.

Figure 3. NWHI BMUS species composition of landings by weight



Data table for Figure 3 (in thousands of pounds)

Species	1989	1990	1991[1]	1992[1]	1993[1]	1994[1]	1995[1]	1996[2]	1997[2]	1998[2]	1999[2]	2000[2]
Opakapaka	112	79	86	145	158	145	105	79	109	87	77	53
Onaga	13	21	46	23	40	42	53	30	55	48	93	92
Ehu	9	25	20	8	11	15	8	17	15	17	17	13
Hapuupuu	66	85	59	57	59	68	54	49	57	70	59	23
Butaguchi	57	103	75	79	64	61	47	46	51	38	28	29
Uku	5	77	69	86	33	78	75	61	37	55	36	43
White ulua	38	9	12	12	5	10	5	12	5	5	3	2
Other BMUS	1	14	10	6	14	17	12	12	14	10	8	7

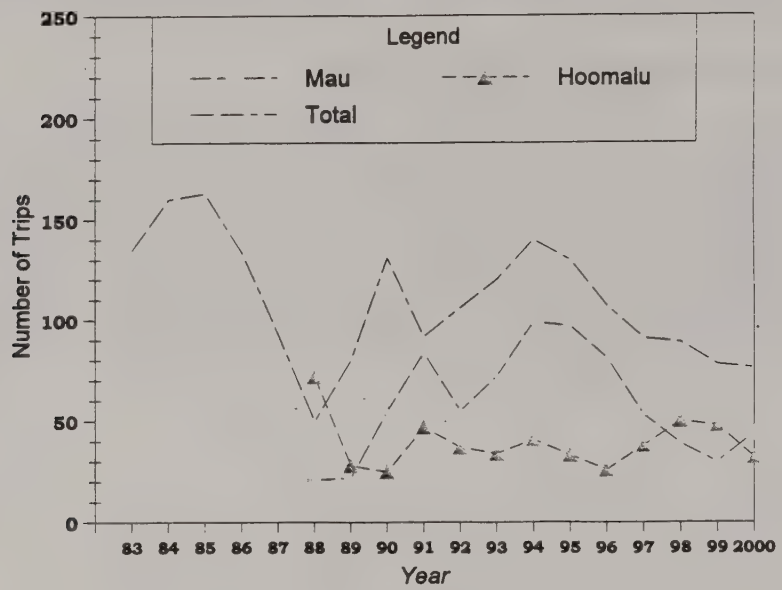
[1] Data from a combination of NMFS and HDAR data.
[2] Data from HDAR data set.

Source: Data for 1996-2000 is from the HDAR integrated data set. Data for 1991-1995 are from a combination of HDAR and NMFS market monitoring program. Data from 1987-1990 are expanded NMFS estimates.

Calculation: HDAR data was compiled and used.

Interpretation: The 2000 NWHI overall species composition(pounds landed) has shown an increase in the percentage of onaga and uku landings. Figure 2 shows that for the landings per trip in the Mau zone onaga has remained stable while uku has decreased considerably. The Hoomalu landings per trip shows an strong increase for both species indicating that perhaps the fishermen are targeting the more abundant(uku) or higher priced species(onaga). If this targeting strategy is true then it should be no suprise that there was a decrease in the percentage of opakapaka and hapuupuu landed. Time spent targeting onaga and uku are necessarily lost for targeting (and catching) other species.

Figure 4. Number of trips made by NWHI bottomfish fleet, Mau and Hoomalu Zones



	Trips		
Year	Mau	Hoomalu	Total
1985	NA	NA	160
1986	NA	NA	163
1987	NA	NA	134
1988	21	72	93
1989	22	28	50
1990	55	25	80
1991[1]	84	47	131
1992[1]	55	37	92
1993[1]	72	34	106
1994[1]	99	41	140
1995[1]	97	33	130
1996[2]	81	26	107
1997[2]	53	38	91
1998[2]	39	50	89
1999[2]	30	48	78
2000[2]	**47**	**36**	**83**
mean	58.08	39.62	107.94
s.d.	26.73	12.63	31.89

[1] Based on combined NMFS and HDAR data.
[2] Based on HDAR data.

Source: Data for 1996-2000 was from HDAR. Data for 1991-1995 are from a combination of

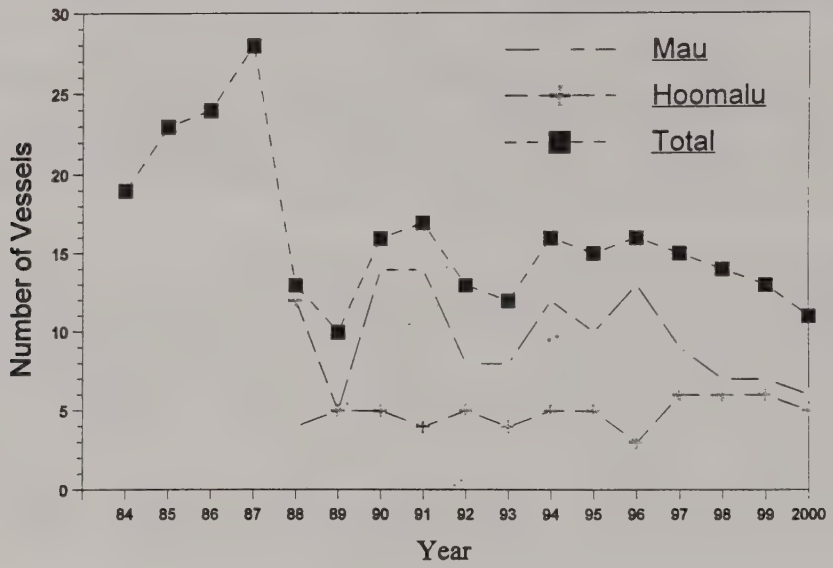
HDAR and NMFS market monitoring program and the HDAR fast-track data system. Data from 1986-1990 are NMFS estimates.

Calculation: HDAR data was used in 2000. The data for 1995 have been updated. The trips were totaled by management area fished. Data in this report are only from those trips that were directed at bottomfish species or in which bottomfish gear was used (zero catch trips or efforts were included). Trolling only trips to the NWHI that were not targeting BMUS are not included. Trolling only trips that resulted in BMUS being caught were included.

Interpretation: The number of trips made to the Mau zone has increased while the BMUS landings have decreased. There has been a falling out of the small number of dedicated full-time fisherman in the fishery. The additional number of trips are being made by the participants that are not strictly bottomfish fishermen. Instead, they opportunistically target pelagic species more often or to a greater degree than they target bottomfish species. Some trips are trolling only trips that also catch uku and white ulua. They have many more trips that are directed at the weather buoys and Mau zone areas for troll and other activities such as palu-ahi, ika-shibi, and kona crabbing. Species availability, weather conditions, and market price and demand may be the driving factor in the decision to do the multiple target trips or to change target species during a trip.

The 2000 Hoomalu zone number of fishing trips have also decreased with 2 of the 5 vessels making only the minimum number of trips to maintain their permits.

Figure 5. Number of vessels in the NWHI bottomfish fleet, Mau and Hoomalu Zones



	Boats		
Year	Mau	Hoomalu	Total[2]
1984	NA	NA	19
1985	NA	NA	23
1986	NA	NA	24
1987	NA	NA	28
1988	4	12	13
1989	5	5	10
1990	14	5	16
1991[1]	14	4	17
1992[1]	8	5	13
1993[1]	8	4	12
1994[1]	12	5	16
1995[1]	10	5	15
1996[3]	13	3	16
1997[3]	9	6	15
1998[2]	7	6	13
1999[3]	7	6	13
2000[3]	**6**	**5**	**11**
mean	9.00	5.46	16.12
s.d.	3.37	2.15	4.88

[1] Based on a combination NMFS and HDAR data set.
[2] Total may not match sum of areas due to vessel participation in multiple areas.
[3] Based on HDAR data.

Source: Data for 1996-2000 was from HDAR. Data for 1991-1995 are from a combination of

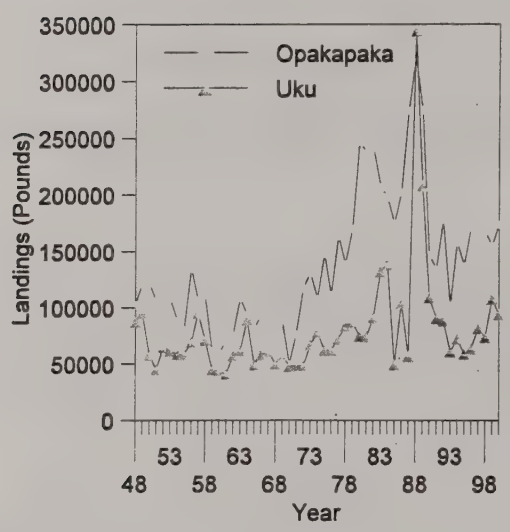
HDAR and NMFS market monitoring program and the HDAR fast-track data system. Data from 1984-1990 are NMFS estimates.

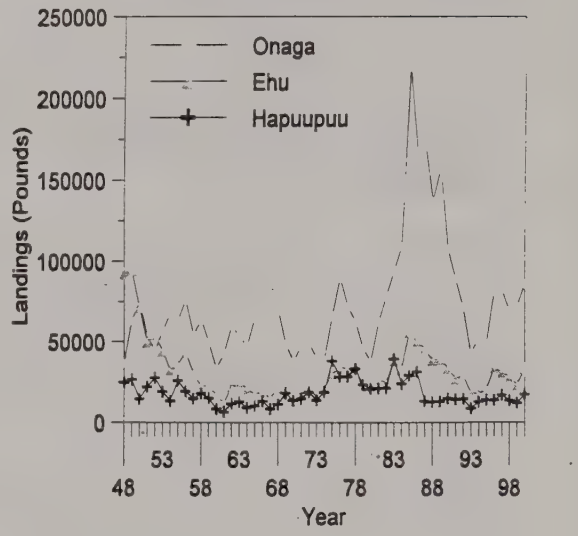
Calculation: The 2000 number of vessels were totaled by management area fished.

Interpretation: The number of participants has decreased by 1 in each zone. The Mau zone has lost a dedicated full-time bottomfish fisherman. The Hoomalu zone has lost a part-time bottomfish fisherman.

In 1996 due to fishermen's economic concerns, the Mau Zone Task Force was formed to address the problem and suggest possible solutions. The Task Force moved in the direction of a limited entry fishery much like the Hoomalu zone and the subsequent 1997 moratorium on additional new participants essentially capped the fleet pending new regulations. The moratorium itself had reduced the number of vessels from 13 in 1996 to 9 in 1997 to 7 in 1998. The new limited entry regulations and its initial qualification criteria were put into effect in mid-1999. It allows all qualifying participants initial entry after which a "use it or lose it" criteria would allow the managers to reduce the fleet to its target number. The assumption that the number of initial entrants would be large was unfounded as there was less interest than expected. It was expected that fleet size reduction would occur rapidly as the Mau zone has historically had a large turnover in annual participation.

Figure 6. MHI species composition of landings by weight





Source: Total commercial landings by species are from HDAR commercial catch report data for the MHI with no screening by gear. 1999 values have been updated from last year's report with an essentially complete data set for that year. 2000 values are preliminary estimates of annual landings based on landings reported to date and should increase for all species by an unknown amount.

Comments: Landings presented here are commercial reported landings only and do not include any expansion for recreational landings.

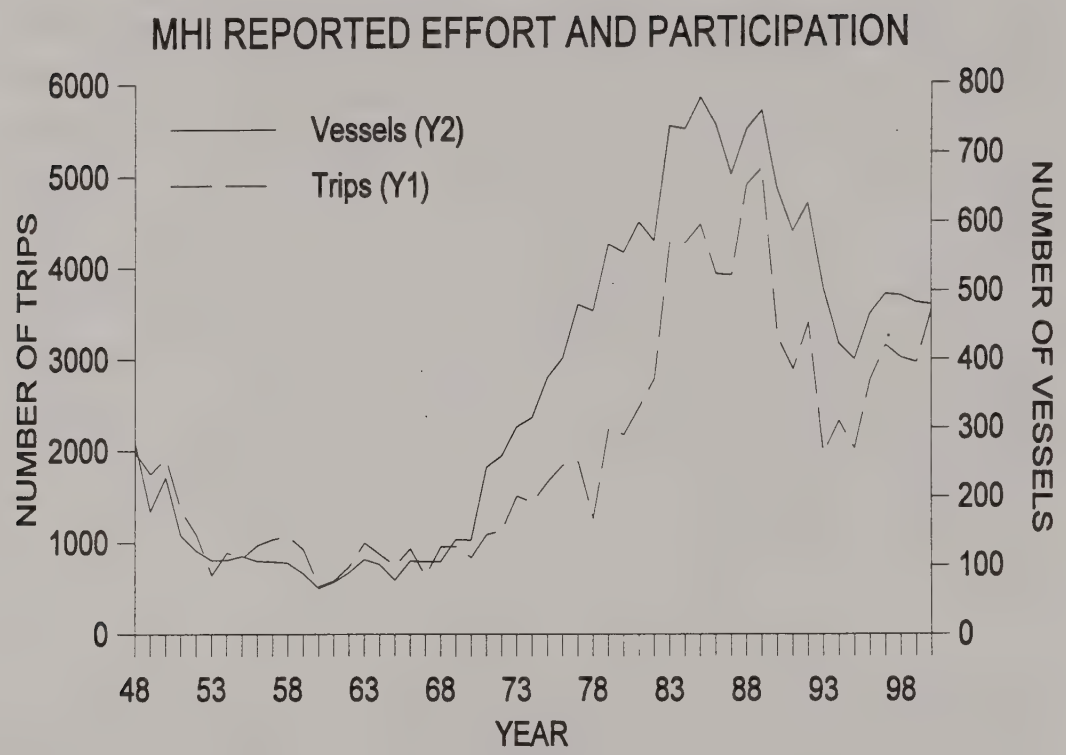
Interpretation: Most species show declining trends from the mid- and late-eighties to 1993 then increases to date. The prevailing interannual pattern in landings is episodic versus predictably periodic or constant. 2000 landings for all species are preliminary as they are based on catch reports submitted to date. Data from earlier years is essentially complete. Landings for all species were highest in the mid 1980s.

MHI Landings by Species

YR	OPA	ONA	EHU	UKU	HAP
1948	102651	36804	92323	87235	24609
1949	121243	62979	94097	95273	26397
1950	121664	75398	71286	57814	14514
1951	106423	53018	49699	45065	22000
1952	112917	44604	53716	64799	27499
1953	108504	56506	44200	61619	19009
1954	88641	67583	32278	58767	13367
1955	80516	63208	36017	58564	25849
1956	134980	75986	43313	69108	19224
1957	106656	53988	30157	95267	14782
1958	111131	63774	22309	71321	18033
1959	62043	49745	23107	44705	15294
1960	59405	33158	16950	43186	8418
1961	70083	42701	12370	41134	6642
1962	75492	59788	21742	57568	11663
1963	108505	53225	25267	61601	12865
1964	93618	47325	20914	89156	9321
1965	81039	65040	17605	49485	10297
1966	92815	69634	19342	57849	13277
1967	89364	64022	14899	60970	8480
1968	89908	69922	21984	49677	11287
1969	88621	48454	16483	57542	18300
1970	49655	37894	13364	47443	13651
1971	76388	47250	17626	48710	14746
1972	117367	49213	20347	48077	18994
1973	130785	39811	16336	66875	13878
1974	107828	38883	21015	77939	18874
1975	147755	66029	30155	62117	38140
1976	111520	89518	33788	62165	28214
1977	163813	71747	33689	71915	28540
1978	138931	62208	34333	83798	33271
1979	170180	46271	20339	87128	23538
1980	247378	37489	21712	74782	20962
1981	237254	62351	26900	73921	21178
1982	241977	78372	24542	90793	21263
1983	207345	94082	38793	131860	39447
1984	198260	109046	33022	138313	24019
1985	174746	218552	56039	49264	29055
1986	202467	167112	50259	104047	31626
1987	274929	171416	46018	56753	13232
1988	320601	136641	38547	344128	12838
1989	275167	156952	39393	208171	12954
1990	146861	107514	33848	108840	14934
1991	134326	88978	26902	90272	14216
1992	178014	71715	29461	88474	14454
1993	102514	43141	17981	60910	8593
1994	158276	51502	18000	72133	12712
1995	137473	48948	20689	59036	13819
1996	171428	80953	33925	63792	13723
1997	172308	82874	30778	81367	16984
1998	167918	69077	28417	73724	13610
1999	155300	71749	23009	107826	12080
2000	**171121**	**85655**	**33541**	**94067**	**17371**
mean	139549	72449.2	31940	79365	18152
s.d.	60167.6	37228.3	17255	46782.6	7596.3

Figure 7. MHI reported effort and participation

Source: HDAR commercial catch report data.



Calculation & Adjustment: MHI commercial bottomfish trip and vessel values are obtained from the HDAR C3 report data. Participation (# of vessels) is presented as the number of unique license numbers reporting bottomfishing trips for a particular year. For 1948-1993 the reported value for participation is based on the State fiscal year (July-June). For 1994-1999 the participation is reported on a calendar year basis. Trips qualify as bottomfish trips if they use bottomfish handline gear and at least 90% of the catch is of BMUS species.

Interpretation: Updated data for 1999 show that reported effort and participation declined slightly from 1998 values and are both higher than their long-term means, but much lower than their peaks of the mid 80's. Preliminary 2000 values for effort and participation are based on reports received to date and not expanded for any late reporting. Participation indicated to date is nearly identical to that of 1999 and may well increase to a greater value when all reports are submitted. 2000 effort is already well above 1999 levels showing a 19% increase in the number of reported trips. This value is apt to increase with complete reporting.

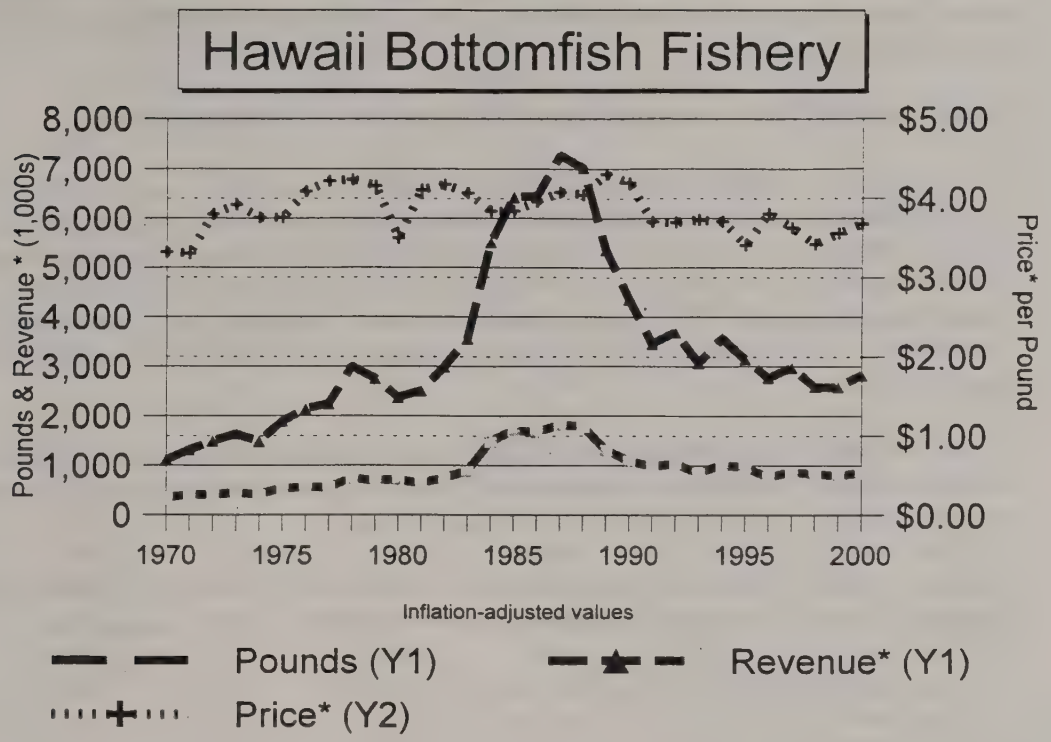
Landings and CPUE for bottomfish trips are tabulated in the following table. These figures differ

from those presented in Figure 1 (landings) and Figure 14 (CPUE). Those presented here are screened for bottomfish trips only (as defined below). In Figure 1 landings are for bottomfish species caught on all gears without screening criteria and in Figure 14 data are further screened by area fished and landings of individual fishers to reflect the effective fishing effort required to "standardize" CPUE. Landings in 2000 are above the long-term average, whereas that for CPUE is the lowest on record.

Yr	# Ves	# Trip	Tot.Lbs	Lbs/Trip
48	207	1987	323858	162.99
49	196	1751	338406	193.26
50	164	1924	302137	157.04
51	126	1355	282271	208.32
52	110	1091	232235	212.86
53	106	650	123867	190.56
54	103	894	233557	261.25
55	108	836	197757	236.55
56	106	975	257183	263.78
57	102	1041	239485	230.05
58	96	1075	238138	221.52
59	76	929	213322	229.63
60	69	527	148339	281.48
61	65	586	171768	293.12
62	98	742	219203	295.42
63	110	1001	290690	290.40
64	87	876	297039	339.09
65	85	750	237624	316.83
66	97	940	274293	291.80
67	99	641	236588	369.09
68	116	959	252305	263.09
69	130	964	232754	241.45
70	219	841	169792	201.89
71	198	1093	173001	158.28
72	185	1135	194967	171.78
73	238	1511	246341	163.03
74	241	1442	218750	151.70

Yr	# Ves	# Trip	Tot.Lbs	Lbs/Trip
75	295	1664	322986	194.10
76	306	1845	301071	163.18
77	377	1881	323991	172.24
78	414	1268	272620	215.00
79	423	2251	316132	140.44
80	461	2181	372369	170.73
81	430	2481	392205	158.08
82	526	2790	432259	154.93
83	541	4283	484603	113.15
84	558	4272	428608	100.33
85	583	4481	476457	106.33
86	538	3939	476745	121.03
87	535	3920	475313	121.25
88	572	4911	687379	139.97
89	537	5091	634691	124.67
90	501	3242	338401	104.38
91	469	2895	285046	98.46
92	407	3401	329024	96.74
93	403	1977	199023	100.67
94	423	2333	226436	97.06
95	400	2031	194828	95.93
96	466	2780	253887	91.33
97	495	3158	288107	91.23
98	493	3023	268607	88.85
99	483	2970	261148	87.92
2000	**480**	**3544**	**299266**	**84.44**
mean	295	2021	295979	181.67
s.d.	181	1257	112403	75.14

Figure 8. Hawaii bottomfish landings, revenues, prices, 1970 - present. (* Inflation-adjusted)



Interpretation: After twenty years of growth, Hawaii bottomfish landings and *real* (inflation-adjusted) revenue peaked in 1987 and have declined by 50% and 60%, respectively, in the almost fifteen years since then. Much of this decline has been caused by reductions in fishing participation (vessels and trips) due to limited entry and to a weak market for fresh bottomfish in the 1990s.

There is no particular patter for inflation-adjusted ex-vessel bottomfish prices. Previous economic research (mid-1980s) showed a strong inverse relationship between monthly and weekly price and landings, but this relationship appears weaker in the 1990s, perhaps due to increased imports of bottomfish from Pacific island nations. On an annual basis, this relationship is not seen at all. Changes in area and species composition may also be changing the aggregate price (discussed later in the report).

Of particular importance in interpreting bottomfish price trends, which strongly influence the economic performance of bottomfish vessels, is the increasing presence of imported bottomfish (snappers) in the Hawaii market. According to U.S. Customs data for the Port of Honolulu,

575,000 pounds of snapper were imported in CY 2000 worth $1.7 million ($2.96 per pound). This amounts to roughly two thirds of domestic supply and thus a signficant factor in ex-vessel prices. Tonga and Australia were the largest sources of fresh snapper, with Fiji and New Zealand also being major sources.

Data: "Landings" refer to Pounds Caught (vs. Pounds Sold). Revenue is ex-vessel.

Hawaii Division of Aquatic Resources (HDAR) commercial catch reports are used for all the main Hawaiian Islands (MHI) landings and revenue; HDAR reports are also used for Northwestern Hawaiian Islands (NWHI) landings from 1970-83 although there may be problems of under-reporting during the latter part of that period[1]. NMFS estimates from shoreside monitoring are used for NWHI landings from 1984 - 1990. Data from 1991 - 1997 use a combination of HDAR figures and NMFS adjustments, while data for 1998 - present are solely from HDAR data.

HDAR MHI data for calendar year 2000 are preliminary, representing approximately 85% of anticipated reports for all gears, all species. NWHI data are considered complete due to a fast-track system which includes NMFS shoreside monitoring.

Revenue* represents nominal revenue adjusted for inflation by the Honolulu Consumer Price Index (HCPI), `983-84 baseline; revenue* and prices* are adjusted to the current year.

Data source: Data imported from HTOT00x.xls (4/12/01)

Note: Main Hawaiian Islands data for 2000 are preliminary in this report.

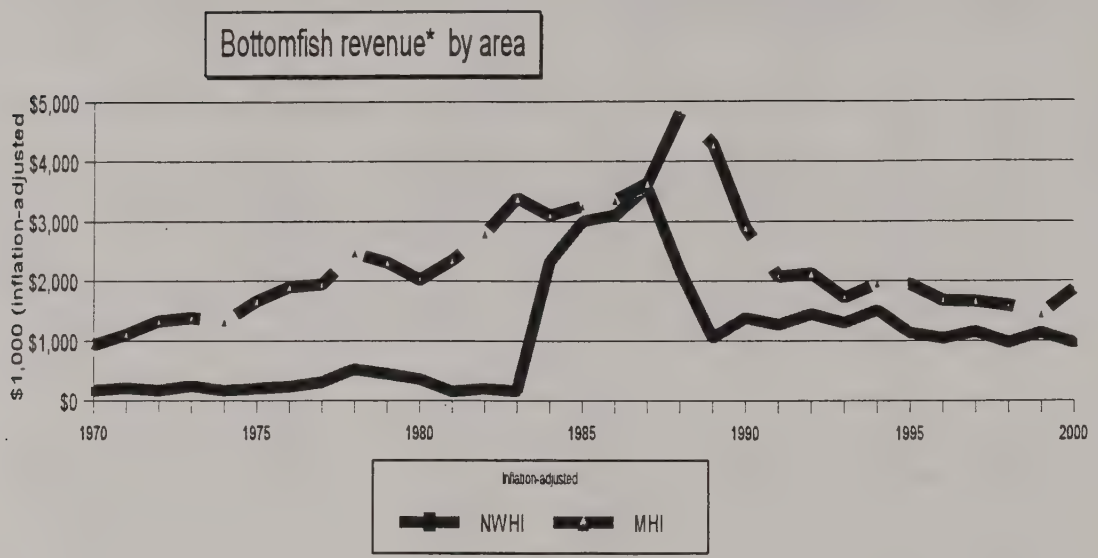
[1] The likelihood of that under-reporting is shown by the "jump" in NWHI landings when the Western Pacific Regional Fishery Management Council (and subsequently in 1987 NMFS) shoreside monitoring program began in 1984, with 38,000 pounds reported landed by the State in 1983 and 661,000 pounds reported landed by the Council in 1984. NWHI reported NWHI landings to HDAR in 1984 were 224,000 pounds.

Hawaii bottomfish landings, revenue, and price, 1970 - present. (* Inflation-adjusted.)

	Pounds Caught All Areas (1,000s)	Revenue All Areas ($1,000)	Revenue* (Inflation-adjusted)	Price[2] Per Pound Sold	Price * (Inflation-adjusted)	HCPI
1970	344	$253	$1,113	$0.76	$3.32	40.9
1971	410	$312	$1,318	$0.78	$3.30	42.6
1972	407	$366	$1,496	$0.93	$3.80	44.0
1973	454	$418	$1,638	$1.00	$3.92	45.9
1974	413	$421	$1,491	$1.06	$3.76	50.8
1975	549	$584	$1,893	$1.16	$3.76	55.5
1976	558	$693	$2,138	$1.33	$4.09	58.3
1977	562	$764	$2,246	$1.44	$4.22	61.2
1978	740	$1,100	$3,003	$1.55	$4.24	65.9
1979	698	$1,123	$2,760	$1.69	$4.16	73.2
1980	713	$1,082	$2,377	$1.59	$3.50	81.9
1981	643	$1,262	$2,509	$2.07	$4.11	90.5
1982	750	$1,600	$2,998	$2.23	$4.18	96.0
1983	887	$1,976	$3,562	$2.31	$4.17	99.8
1984	1,481	$3,192	$5,506	$2.23	$3.84	104.3
1985	1,717	$3,853	$6,424	$2.31	$3.84	107.9
1986	1,682	$3,958	$6,456	$2.43	$3.96	110.3
1987	1,819	$4,687	$7,275	$2.63	$4.08	115.9
1988	1,794	$4,796	$7,026	$2.76	$4.05	122.8
1989	1,314	$3,867	$5,364	$3.10	$4.31	129.7
1990	1,094	$3,371	$4,366	$3.24	$4.20	138.9
1991	984	$2,864	$3,460	$3.07	$3.71	148.9
1992	1,043	$3,199	$3,691	$3.21	$3.70	155.9
1993	862	$2,749	$3,077	$3.33	$3.73	160.7
1994	1,011	$3,277	$3,579	$3.39	$3.71	164.7
1995	972	$2,949	$3,150	$3.19	$3.41	168.4
1996	768	$2,636	$2,773	$3.62	$3.81	171.0
1997	872	$2,855	$2,983	$3.47	$3.63	172.2
1998	834	$2,470	$2,589	$3.26	$3.42	171.6
1999	801	$2,496	$2,590	$3.43	$3.56	173.4
2000p	860	$2,831	$2,831	$3.68	$3.68	179.9
Average	904	$2,194	$3,345	$2.33	$3.84	109.77
Standard Deviation	414	$1,361	$1,666	$0.95	$0.28	46.98

Figure 9. Hawaii bottomfish landings, revenue*, and price* by source, 1970 - present. (*Inflation adjusted)

[2] Price calculated on Pounds Sold (not shown), not Pounds Caught.



Data: Hawaii Division of Aquatic Resources (HDAR) commercial catch reports are used for all the main Hawaiian Islands (MHI) landings and revenue; HDAR reports are also used for Northwestern Hawaiian Islands (NWHI) landings from 1970-83. NMFS estimates from shoreside monitoring are used for NWHI landings from 1984-96. HDAR landings are again used for NWHI landings from 1997 to present.

Revenue* represents nominal revenue adjusted for inflation by the Honolulu Consumer Price Index (HCPI); revenue* and prices* are adjusted to the current year.

Data source: Data imported from HTOT00x.xls (4/12/01)

Interpretation: Inflation-adjusted revenue from main Hawaiian Islands bottomfish grew steadily through the 1970s and 1980s as both *real* prices and total landings increased substantially. Beginning in 1988, total landings began to decline, falling almost 60% in the subsequent decade, while inflation-adjusted prices have been variable, showing no particular trend although remaining substantially above the long-term average. NWHI bottomfish landings also grew dramatically in the mid-1980s and then tailed off, stabilizing in the 1990s at a level below the main Hawaiian Islands. Inflation-adjusted revenue is only 25% that in 1987 (the peak).

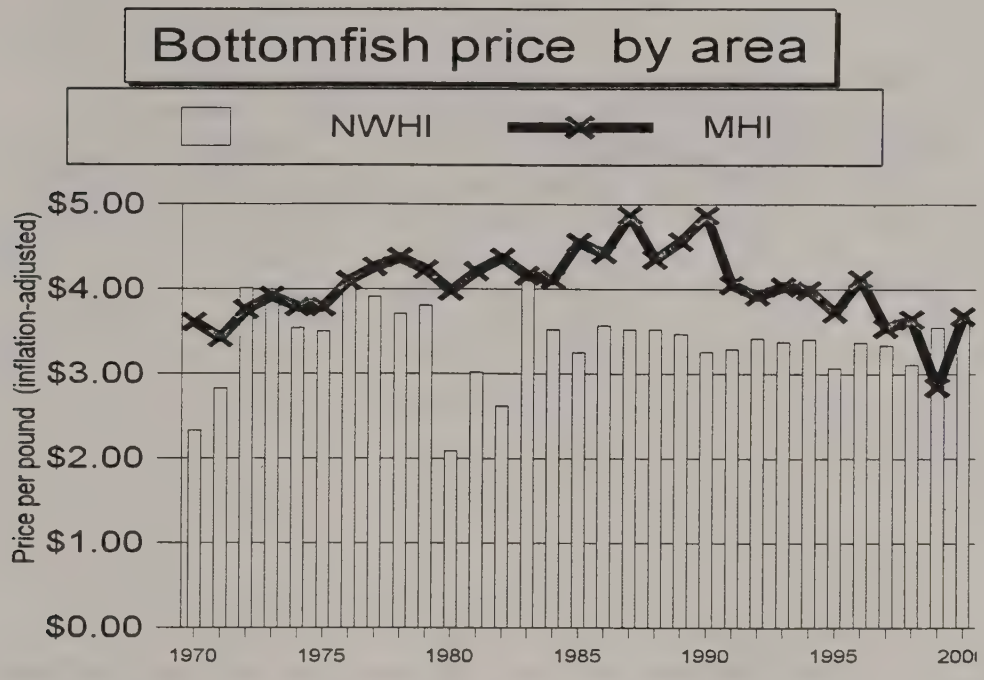
These changes in total landings are related to both catch rates and participation. More interpretation can be gleaned from discussion in detailed tables and figures in this report.

Hawaii bottomfish landings, revenue, and price by source, 1970 - present.
(* Inflation-adjusted.)

	NWHI Pounds Caught	NWHI Revenue	NWHI Revenue*	NWHI Aggregate	NWHI Aggregate Price *	HCPI
		Nominal Values	(Inflation-adjusted)	Nominal Price	(Inflation-adjusted)	
1970	74	$39	$172	$0.53	$2.33	40.9
1971	75	$50	$211	$0.67	$2.83	42.6
1972	43	$42	$172	$0.98	$4.01	44.0
1973	62	$63	$247	$1.02	$4.00	45.9
1974	49	$49	$174	$1.00	$3.54	50.8
1975	59	$64	$207	$1.08	$3.50	55.5
1976	59	$78	$241	$1.32	$4.07	58.3
1977	83	$104	$306	$1.33	$3.91	61.2
1978	143	$194	$530	$1.36	$3.71	65.9
1979	118	$183	$450	$1.55	$3.81	73.2
1980	172	$163	$358	$0.95	$2.09	81.9
1981	52	$79	$157	$1.52	$3.02	90.5
1982	77	$108	$202	$1.40	$2.62	96.0
1983	38	$89	$160	$2.34	$4.22	99.8
1984	661	$1,350	$2,329	$2.04	$3.52	104.3
1985	922	$1,800	$3,001	$1.95	$3.25	107.9
1986	869	$1,900	$3,099	$2.19	$3.57	110.3
1987	1015	$2,300	$3,570	$2.27	$3.52	115.9
1988	625	$1,500	$2,197	$2.40	$3.52	122.8
1989	303	$756	$1,049	$2.50	$3.47	129.7
1990	423	$1,066	$1,381	$2.52	$3.26	138.9
1991	387	$1,053	$1,272	$2.72	$3.29	148.9
1992	424	$1,255	$1,448	$2.96	$3.42	155.9
1993	385	$1,164	$1,303	$3.02	$3.38	160.7
1994	443	$1,382	$1,510	$3.12	$3.41	164.7
1995	369	$1,060	$1,132	$2.87	$3.07	168.4
1996	309	$989	$1,040	$3.20	$3.37	171.0
1997	346	$1,106	$1,155	$3.20	$3.34	172.2
1998	329	$924	$969	$2.97	$3.11	171.6
1999	341	$1,102	$1,143	$3.42	$3.55	173.4
2000p	281	$964	$964	$3.68	$3.68	179.9
Average	308	$741	$1,037	$2.07	$3.40	109.8
Standard Deviation	269	$655	$932	$0.90	$0.47	46.98

	MHI Pounds Caught	MHI Revenue	MHI Revenue* (Inflation-adjusted)	MHI Aggregate Price	MHI Aggregate Price * (Inflation - adjusted)	HCPI
1970	270	$214	$941	$0.82	$3.61	40.9
1971	335	$262	$1,106	$0.81	$3.42	42.6
1972	364	$324	$1,325	$0.92	$3.76	44.0
1973	392	$355	$1,391	$1.00	$3.92	45.9
1974	364	$372	$1,317	$1.07	$3.79	50.8
1975	485	$513	$1,663	$1.17	$3.79	55.5
1976	499	$615	$1,898	$1.33	$4.10	58.3
1977	479	$660	$1,940	$1.45	$4.26	61.2
1978	597	$906	$2,473	$1.60	$4.37	65.9
1979	580	$940	$2,310	$1.72	$4.23	73.2
1980	541	$919	$2,019	$1.81	$3.98	81.9
1981	591	$1,183	$2,352	$2.12	$4.21	90.5
1982	673	$1,492	$2,796	$2.33	$4.37	96.0
1983	847	$1,882	$3,393	$2.31	$4.16	99.8
1984	803	$1,797	$3,100	$2.38	$4.11	104.3
1985	765	$1,954	$3,258	$2.72	$4.54	107.9
1986	811	$2,052	$3,347	$2.71	$4.42	110.3
1987	785	$2,345	$3,640	$3.14	$4.87	115.9
1988	1,166	$3,288	$4,817	$2.97	$4.35	122.8
1989	1,007	$3,090	$4,286	$3.29	$4.56	129.7
1990	651	$2,242	$2,904	$3.76	$4.87	138.9
1991	562	$1,713	$2,070	$3.35	$4.05	148.9
1992	588	$1,842	$2,126	$3.40	$3.92	155.9
1993	462	$1,535	$1,718	$3.60	$4.03	160.7
1994	536	$1,793	$1,958	$3.65	$3.99	164.7
1995	570	$1,818	$1,942	$3.48	$3.72	168.4
1996	442	$1,593	$1,676	$3.92	$4.12	171.0
1997	519	$1,589	$1,660	$3.39	$3.54	172.2
1998	496	$1,517	$1,590	$3.47	$3.64	171.6
1999	459	$1,393	$1,445	$2.75	$2.85	173.4
2000p	576	$1,858	$1,858	$3.68	$3.68	179.9
Average	588	$1,407	$2,282	$2.41	$4.05	107.4
Standard Deviation	197	$787	$932	$1.01	$0.42	45.95

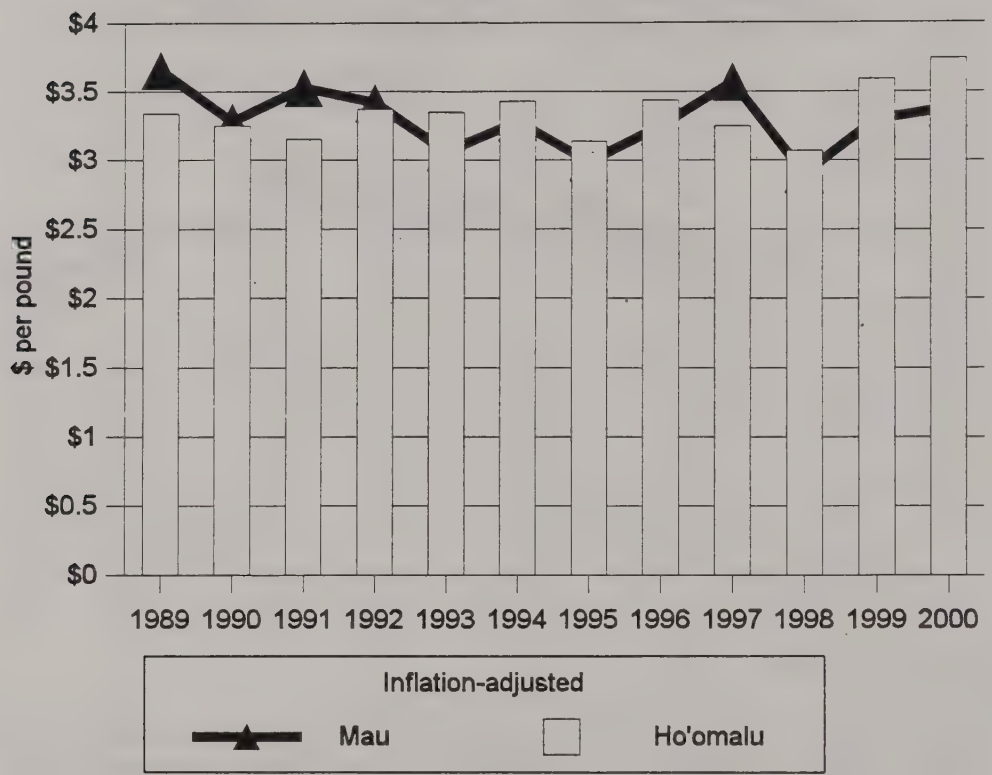
Figure 10. Hawaii bottomfish ex-vessel prices* by source, 1987 - present.
(* Inflation-adjusted.)



Data: See Figure 9.

Interpretation: Historically, bottomfish caught in the main Hawaiian Islands have tended to have higher aggregate prices, reflecting both species composition and greater freshness. However, in the late 1990s, the prices converged. This might have reflected a relative lowering of the MHI bottomfish prices, perhaps reflecting the softness of the upscale part of the Hawaii market. Onaga and opakapaka comprise the largest valued landings in each area for most years (ignoring the highly fluctuating landings of uku); NWHI ex-vessel prices were $4.35 and $4.40 per pound respectively in CY 2000 while MHI were $5.93 and $ 4.46, respectively. However, the NWHI landings are comprised of a higher percentage of these higher priced species compared to the MHI, so the difference in price for individual species by area is ironed out by the different species compositions between the two areas.

Figure 11. Hawaii Bottomfish (BMUS) Ex-vessel Prices* by NWHI zone, 1989 - present (* Inflation-adjusted).



Interpretation: Mau and Ho'omalu zone aggregate bottomfish prices (not accounting for differences in species composition) have been roughly the same in aggregate over time but diverged rather substantially in recent years, with the Ho'omalu receiving the highest aggregate prices. In inflation-adjusted terms, Mau zone prices have not changed substantial over the past ten years but Ho'omalu zone aggregate prices are 15 - 20% higher than in the late 1980s and early 1990s. On an individual species basis, Mau zone prices exceed those for the Ho'omalu zone, which might be expected since there is a shorter running time from the Mau zone to markets on Oahu and Kauai. Onaga and opakapaka are respectively $5.82 and $4.31 per pound, ex-vessel, from the Mau zone, while from the Ho'omalu zone the prices are $4.31 and $4.36.

Hawaii Bottomfish Ex-vessel Prices* by NWHI zone, 1989 - present.
(*Inflation-adjusted to current year base)

	Nominal Price per Pound		Inflation-adjusted Price		
Year	**Mau**	**Ho'omalu**	**Mau**	**Ho'omalu**	**HCPI**
1989	$2.64	$2.41	$3.66	$3.34	129.70
1990	$2.53	$2.51	$3.28	$3.25	138.90
1991	$2.92	$2.61	$3.53	$3.15	148.90
1992	$2.96	$2.92	$3.42	$3.37	155.90
1993	$2.73	$2.99	$3.06	$3.35	160.70
1994	$3.00	$3.14	$3.28	$3.43	164.70
1995	$2.80	$2.94	$2.99	$3.14	168.40
1996	$3.09	$3.27	$3.25	$3.44	171.00
1997	$3.42	$3.11	$3.57	$3.25	172.20
1998	$2.77	$2.93	$2.90	$3.07	**171.6**
1999	$3.18	$3.46	$3.30	$3.59	**173.4**
2000p	$3.38	$3.74	$3.38	$3.74	**179.9**
Average	$2.95	$3.00	$3.30	$3.34	161.28
Standard Deviation	$0.28	$0.38	$0.23	$0.19	**15.25**

Data: NWHI prices are compiled from NMFS market monitoring landings. Inflation-adjusted values are to current year base HCPI (Honolulu Consumer Price Index).

Data source: nwhi2000.xls (4/9/01)

Table 1. Hawaii bottomfish species landings and prices, all areas combined, 1999 & 2000.[3]

	1999		2000	
	Pounds	Revenue	Pounds	Revenue
Butaguchi	31,781	48,044	35,543	64,992
Ehu	37,579	127,130	48,511	177,041
Hapuupuu	71,900	201,909	44,665	155,159
Onaga	158,325	713,136	190,175	914,775
Opakapaka	209,134	873,816	226,203	940,746
Uku	130,803	310,271	136,014	327,507
Ulua	6,136	7,923	7,575	8,951
Other BMUS	120,613	152,889	132,412	173,921
Other Bottomfish	34,409	60,864	39,199	67,798
Total Bottomfish	800,680	2,495,982	860,297	2,830,890
	Average Ex-vessel Price per Pound			
	1999		2000	
Butaguchi	$1.63		$2.11	
Ehu	$3.73		$3.90	
Hapuupuu	$2.95		$3.67	
Onaga	$4.77		$5.05	
Opakapaka	$4.41		$4.45	
Uku	$2.49		$2.56	
Ulua	$1.55		$1.40	
Other BMUS	$1.67		$1.88	
Other Bottomfish	$2.22		$2.24	
Total Bottomfish	$3.43		$3.68	

Data & Data Sources: Hawaii Division of Aquatic Resources (HDAR) commercial catch

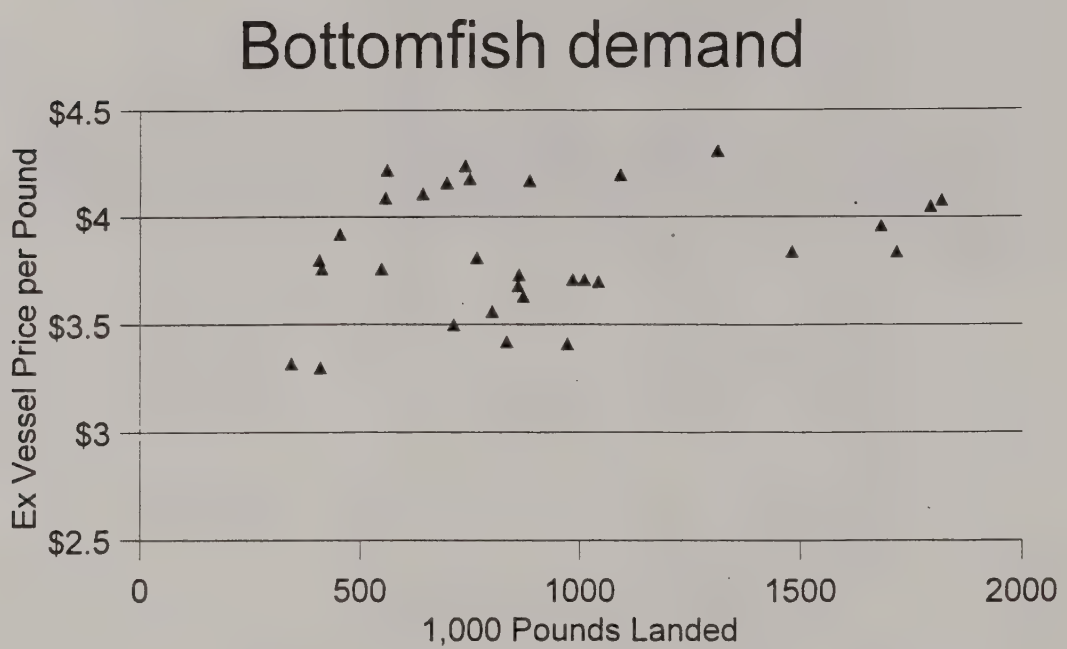
[3] Small differences may exist between species totals and area totals due to rounding.

reports are used for all the main Hawaiian Islands (MHI) landings and revenue; HDAR reports are also used for Northwestern Hawaiian Islands (NWHI) landings from 1970-83. NMFS estimates from shoreside monitoring are used for NWHI landings from 1984-96. HDAR landings are again used for NWHI landings beginning in 1997.

Data imported from: B8700xN.xls (4/12/01)

Interpretation: Species prices show the significance of species composition in aggregate statistics since prices vary from $5.05 per pound, ex-vessel, for onaga to $1.88 for "other" BMUS (bottomfish management unit species). The generally higher species prices in 2000 probably reflect the improved economic climate in Hawaii, increasing the demand for fresh seafood.

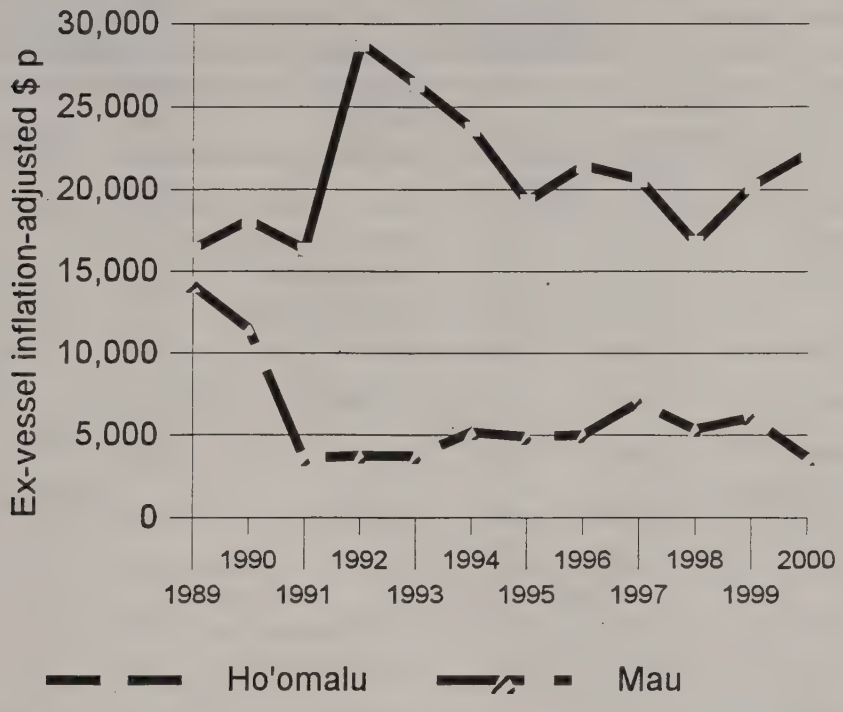
Figure 12. Hawaii bottomfish demand (annual, inflation-adjusted ex-vessel price* and total domestic landings, 1970 - present.)



Data: See Figure 9.

Interpretation: Economic research in the mid-1980s showed a considerable (negative) relationship between weekly bottomfish landings and ex-vessel price. However this relationship is not shown for the annual data. As shown by this and the earlier figure, despite a considerable decrease in total landings since 1987, inflation-adjusted ex-vessel price has been quite stable over the past 30 years. The impact of imports may be significant since it now supplies about 40% of the local market.

Figure 13. NWHI bottomfish inflation-adjusted revenue* per trip by zone, 1989 - present.



Interpretation: The two trends in inflation-adjusted revenue per trip show the distinct difference between Ho'omalu and Mau zone operations. When the limited entry provisions began to take effect in the Ho'omalu zone in 1989-91, revenue rose dramatically but has subsequently declined to slightly more than its average for the period. Revenue (inflation-adjusted) in the Mau zone initially fell (as the limited entry vessels could no longer fish in the Mau zone, only smaller boats remained in the Mau zone). After that initial drop, however, revenue per trip in the Mau zone rose for several years, but has subsequently declined again. Increasingly participation in the Mau zone is on a part-time basis and by vessels that do not specialize in bottomfish fishing. Additional trip revenue, in some cases a substantial proportion, comes from non-bottomfish landings outside the bottomfish grounds of the NWHI.

NWHI bottomfish inflation-adjusted fleet-wide revenue* and revenue* per trip by zone, 1989 - present.

Year	Ho'omalu Zone			Mau Zone		
	Fleet-wide Revenue* $1,000	Trips	Revenue* per Trip	Fleet-wide Revenue* $1,000	Trips	Revenue * per Trip
1989	458	28	16,357	312	22	14,182
1990	453	25	18,120	635	55	11,545
1991	767	47	16,319	302	84	3,595
1992	1,067	37	28,838	208	55	3,782
1993	896	34	26,353	269	72	3,736
1994	972	41	23,707	513	99	5,182
1995	636	33	19,273	475	97	4,897
1996	558	26	21,462	405	81	5,000
1997	784	38	20,632	371	53	7,000
1998	839	50	16,780	210	39	5,385
1999	970	48	20,208	182	30	6,067
2000p	**710**	**32**	**22,188**	**160**	**44**	**3,636**
Average	759	37	20,853	337	61	6,167
Standard Deviation	202.9	8.5	3,955.4	147.5	25.6	3,344.5

Data: Data are compiled from NMFS shoreside market monitoring for 1984-95 and then combined with HDAR data for 1996 and 1997. Since 1998, data is compiled from HDAR figures. Revenue is adjusted for inflation to the current base year by the Honolulu consumer price index.

Data Source: Imported from B8700xN.xls (4/16/01)

NWHI limited entry analysis

Every year the Council is required to examine conditions in the NWHI limited entry area (Ho'omalu zone) to see if additional boats should be allowed to fish. This analysis combines economic and biological criteria, as explained in a subsequent table. The following tables present the average cost-earnings condition of the bottomfish vessels in both NWHI fishing areas.

Table 2. Ho'omalu zone bottomfish vessel, income statement, 2000.

NWHI Bottomfish Vessel
Ho'omalu zone
2000 average: updated
4/9/01

Income Statement			
Revenue			$148,522
Fixed Costs			$71,678
	Capital	$18,056	
	Annual Repair	$12,694	
	Vessel Insurance	$31,516	
	Administrative	$7,441	
	Other	$1,970	
Operating Costs			$114,892
	Fuel & Oil	$9,958	
	Ice	$2,298	
	Bait	$5,253	
	Handling	$14,900	
	Provisions	$7,113	
	Gear and Supplies	$8,426	
	Other (trip basis)	$10,943	
	Crew's income	$35,000	
	Captain's income	$21,000	
	Net on Operations	*$33,631*	
Total Cost			$186,569
Net Revenue			$-38,047

Data source: nwh00h1.xls (4/12/01)

Vessel Operating Characteristics		
Investment	$233,300	
Trips	6.40	
Trip Days: Total & Trip	134	20.90
Fishing Days: Total & Trip	63	9.80
Catch per Day (Lbs): Total	645	
Bottomfish : Other	604	41
Total Catch (Whole lbs)	40,454	
Bottomfish : Other	37,883	2,572
Price per Pound	$3.67	
Bottomfish : Other	$3.74	$2.66
Unallocated trip days	169	
HCPI (1993 base)	1.09	
Fixed Cost rate	1.00	

4/09/01

Interpretation: As in previous years, the average[4] Ho'omalu zone bottomfish fishing vessel failed to cover its total costs through bottomfishing operations in 1999. There was a positive return on operations (Total ex-vessel revenue minus operating costs) of $33,630; presumably other fishing activities or sources of income had to be employed to cover fixed costs ($71,678).[5]

Data: Cost-earnings information was compiled by Hamilton in 1994, and updated to account for inflation and to reflect current operating characteristics.

Data Source: nwhb00h1.xls (4/09/01)

[4] Recalling that in every *average*, some vessels do better, some not as well.

[5] Fixed costs can be covered as well by deferred maintenance, reducing insurance, etc. To the extent that these measures are being taken, they reduce the economic value of the investment.

Table 3. Mau zone bottomfish vessel, income statement, 2000

NWHI Bottomfish Vessel Mau Zone Operations Only 2000 Average: updated 4/09/01 Income Statement			
Revenue			$38,639
Fixed Costs			$13,301
	Capital	$4,093	
	Annual Repair	$4,840	
	Vessel Insurance	$2,833	
	Administrative	$1,535	
	Other	$0	
Operating Costs			$33,134
	Fuel & Oil	$4,158	
	Ice	$1,094	
	Bait	$1,641	
	Handling	$3,900	
	Provisions	$1,751	
	Gear and Supplies	$2,407	
	Other (trip basis)	$3,283	
	Crew's income	$6,100	
	Captain's income	$8,800	
	Net on Operations	*$5,505*	
Total Cost			$46,435
Net Revenue			($7,796)

nwhb00m1.xls
09Apr01

NWHI Mau Bottomfish Vessel Operating Characteristics		
Investment	$157,072	
Trips	5.57	
Trip Days: Total & Trip	50	8.92
Fishing Days: Total & Trip	26	4.64
Catch per Day (Lbs): Total	513	
Bottomfish : Other	365	148
Catch per Trip: Total	2,381	
Bottomfish : Other	1,694	687
Total Catch (Whole lbs)	13,265	
Bottomfish : Other	9,438	3,827
Price per Pound	$2.77	
Bottomfish : Other	$3.04	$2.09
Unallocated trip days	257	
HCPI (1993 base)	1.12	
Fixed Cost rate	0.33	

Data: Cost-earnings information was compiled by Hamilton in 1994, and updated to account for inflation and to reflect current operating characteristics.

Data Source: nwhb00m1.xls (4/19/01)

Interpretation: Mau zone vessels also failed to cover their total costs in 2000, although less of their total operations are (on average) reliant on bottomfish fishing.

Table 4. NWHI entry scenarios for NWHI bottomfish vessels, 2000.

This table presents uses various methodologies that could be used to determine target numbers of vessels for each zone in the Northwestern Hawaiian Islands. Three entry criteria are compared in this analysis: 1) if vessels (on average) achieved the MSY catch rate -- the MSY CPUE scenario; 2) if vessels operated at FTE levels (full-year operations)[6] – the MSY CPUE @ FTE scenario; and 3) if vessels break-even during the year[7] – the Breakeven CPUE @ FTE scenario. Earnings and operating costs are averaged over the period 1994 - 2000.

The MSY level of total BMUS (Bottomfish management unit species) catch for each zone (131,210 pounds for the Mau zone and 455,290 for the Ho'omalu zone) is divided by the estimated annual catch per vessel for the current year derived under the three criteria. This determines the "optimal" number of vessels under various criteria.

NWHI bottomfish target number vessels analysis
2000 operating basis

	NWHI Combined	Mau	Ho'omalu
		Pounds Landed	
Maximum Sustainable Yield (MSY)	586,490	131,210	455,290
% MSY by zone	100.0%	22.4%	77.6%
2000 actual catch	281,000	47,800	190,300
% of zone's MSY	47.9%	36.4%	41.8%

[6] FTE operations amount to 278 trip days per year (allowing 5 days turn-around between trips and 30 days haul-out per year). This represents a very intense level of operations and may indeed not be feasible for most vessels.

[7] The Breakeven BMUS catch rate was 581 pounds per fishing day in the Mau zone and 1090 pounds in the Ho'omalu zone, compared to the actual CY 2000 catch rates of 270 pounds and 604 pounds per day.

NWHI Bottomfish fishery – target number of vessels analysis

Catch & operating levels	Number of Vessels: Mau		Ho'omalu	
2000 Actual	6.0		5.0	
1994-2000 average	8.9		5.3	
Criterion	**Current year**	**1994-Current year average**	**Current year**	**1994-Current year average**
Actual cpue and operations	16.6	12.3	12.0	10.5
1) MSY cpue	13.1	12.1	11.4	9.5
2) MSY cpue @ FTE	3.5	3.3	5.7	5.8
3) Breakeven cpue @ FTE	3.7	3.7	5.7	5.1
	BMUS Pounds per Vessel (Annually)			
	Mau		**Ho'omalu**	
Actual cpue and operations	7,884	10,644	37,883	43,506
1) MSY cpue	10,016	10,866	39,764	47,900
2) MSY cpue @ FTE	37,058	40,205	79,529	79,100
3) Breakeven cpue @ FTE	35,297	35,179	79,529	88,600

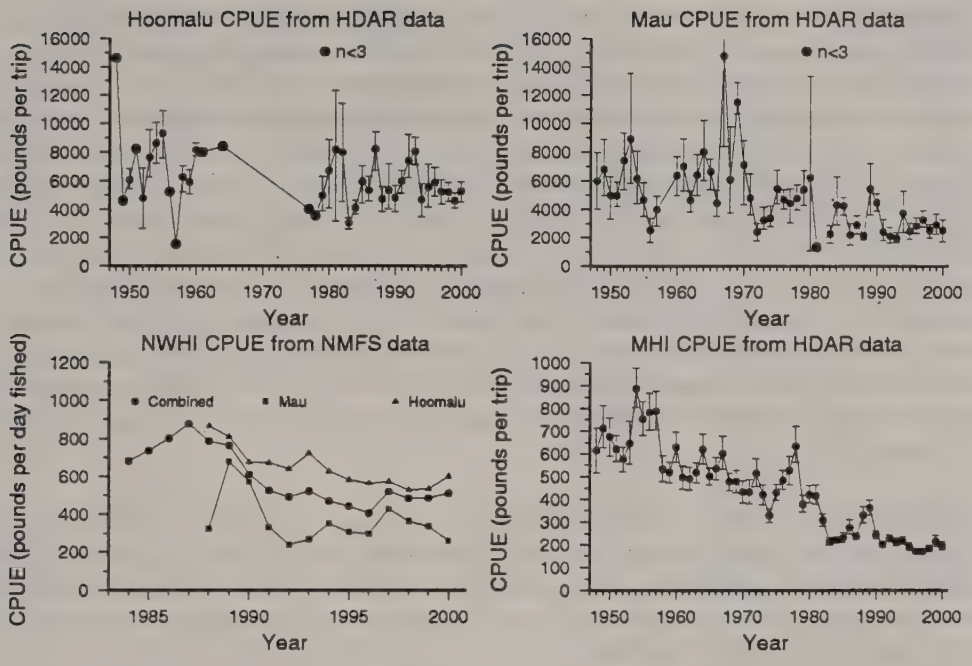
Data: nwhmsy00.xls (4/26/01)

Interpretation: This analysis reflects the orientation of the NWHI Ho'omalu zone limited entry program at its inception. The idea is that there can be a variety of criteria for allowing new entry (or "replacing" existing permits) in the Ho'omalu zone. The economic "optimal" number of vessels -- using full-time equivalent vessels at MSY cpue – is 5, i.e., the number active in CY 2000. The biological "optimal" number is that number of full-time vessels which could take the entire MSY – 6 vessels. The decision whether to allow additional vessels to enter the fishery is based on the Council's choice of criteria.

As for the Mau zone, the target number of vessels is 10 under the use-it-or-lose-it regulations. At that point the Council must implement new criteria for determining the target number of vessels if it chooses to use the Ho'omalu methodology.

The figures given in this table may also be illustrative of the general level of capacity in the fishery but are not formal definitions of capacity utilization.

Figure 14a. CPUE for Hawaiian bottomfish



Comments: MHI CPUE values decreased in 2000 by 9% from the 1999 level, but remained above the 1995-1998 values. The 1999 increase in MHI CPUE was due primarily to a large increase in uku, and to a lesser degree onaga, catches and catch rates. This high in CPUE is similar to that of the late 1980s which was due to increased uku catch rates alone and may not indicate an increase in abundance of other species in either case. Rapid decreases in CPUE from the 1989-90 uku derived peaks appear to be a return to the prevailing slow decline.

In the Mau zone, trip CPUE dropped 14% from 1999 values to about 42% of early values. On a catch per day basis, the Mau 2000 CPUE dropped 23% to 61% of earliest values. Declines in CPUE for this zone may be largely due to the departure of highliners and greater concentration on other fishing methods, e.g. trolling and crab netting.

In the Hoomalu Zone, on the other hand, CPUE is up 13-14% from1999 values on both a daily and trip basis. This may be due to the recent entry of a highliner vessel from the Mau zone.

The trip CPUE values are used for NWHI SPR calculations because they form a longer time series of data and may better estimate virgin fishery catch rates. There are no correction factors for possible changes in trip duration or fleet composition.

Source: MHI CPUE is based on HDAR C-3 catch report data from commercial fishermen. Two NWHI CPUE's are presented. Trip based CPUE is derived from HDAR C-3 catch report data from the earlier years and more recently from HDAR trip sales reports. Daily CPUE is currently derived from HDAR daily catch logs. In earlier years, HDAR data was combined with the NMFS vessel interview program catch data to obtain appropriate data and full coverage.

Calculation: MHI trips were screened to only include trips from the areas of Maui, Lanai, Molokai, and Penguin Banks that had at least 90% of the catch by weight in bottomfish. Additionally, some MHI small boats were excluded based on minimum annual landings criteria to correct for temporal changes in the fleet composition (licensees must land at least 30% of the median value of the top ten producers to qualify). The NMFS vessel interview data prior to 1988 does not allow separate Mau and Hoomalu CPUE calculations; therefore, the combined area NWHI CPUE is presented as well. The NWHI trip CPUE used data screened to only include trips where at least 90% of the catch by weight was bottomfish and at least 1000 pounds of bottomfish were caught. All catch data reported by the same licensee on consecutive days were collapsed to a trip summary, since 1) most other reports are apparent multi-day trip summaries, and 2) consecutive day reporting may be reflective of marketing rather than fishing activity. There was an apparent absence of Hoomalu Zone trips from the mid-1960s until the late-1970s. The 95% non-parametric confidence intervals for the HDAR CPUE's were calculated by bootstrapping.

Interpretation: Decreases in MHI CPUE to about 30% of early CPUE values (mean of the first 5 years recorded) signify a strong yellow light condition for the fishery in this area. In the Mau zone CPUE has dropped from earliest values to 42% and 61% for trip based and daily based CPUE respectively, a borderline condition. For the Hoomalu zone these values are 69% and 82 % respectively, a healthy condition.

Figure 14a. data summaries:

	Pounds/Trip		
Year	MHI	Mau	Hoomalu
1948	614	5968	14635
1949	713	6799	4614
1950	677	4966	6072
1951	621	4980	8228
1952	577	7407	4766
1953	645	8937	7627
1954	887	6158	8613
1955	755	4659	9336
1956	784	2523	5202
1957	789	3958	1535
1958	533	NA	6254
1959	519	NA	5897
1960	630	6379	8139
1961	496	6999	7978
1962	491	4641	NA
1963	518	6410	NA
1964	619	8028	8390
1965	503	6656	NA
1966	536	4413	NA
1967	602	14749	NA
1968	478	6055	NA
1969	480	11484	NA
1970	433	7111	NA
1971	433	4784	NA
1972	514	2386	NA
1973	421	3224	NA
1974	329	3367	NA

	Pounds/Trip		
Year	MHI	Mau	Hoomalu
1975	430	5439	NA
1976	485	4653	NA
1977	527	4387	4000
1978	635	4753	3550
1979	380	5361	4951
1980	421	6210	6687
1981	416	1336	8167
1982	307	NA	7953
1983	214	2242	3025
1984	220	4308	4085
1985	230	4239	5909
1986	274	2206	5301
1987	237	2889	8187
1988	329	2136	4702
1989	361	5412	5328
1990	245	4454	4793
1991	202	2413	5928
1992	228	2092	7388
1993	213	1992	8040
1994	218	3748	4651
1995	193	2460	5544
1996	172	2823	5870
1997	170	3294	5234
1998	185	2518	5198
1999	216	2926	4605
2000	**196**	**2525**	**5259**
mean	440	4797	6196
s.d	190	2513	2238

	NMFS NWHI CPUE (lb/day)		
Year	**Mau**	**Hoomalu**	**Combined**
1984	NA	NA	682
1985	NA	NA	736
1986	NA	NA	800
1987	NA	NA	877
1988	322	866	786
1989	677	808	763
1990	573	675	611
1991	333	671	525
1992	239	639	491
1993	267	723	523
1994	353	629	526
1995	306	582	442
1996	298	563	407
1997	429	574	521
1998	364	527	484
1999	337	534	486
2000	**260**	**601**	**513**
mean	366.00	645.54	602.24
s.d.	126.81	102.99	140.02

Figure 14b. Partial CPUE for MHI bottomfish

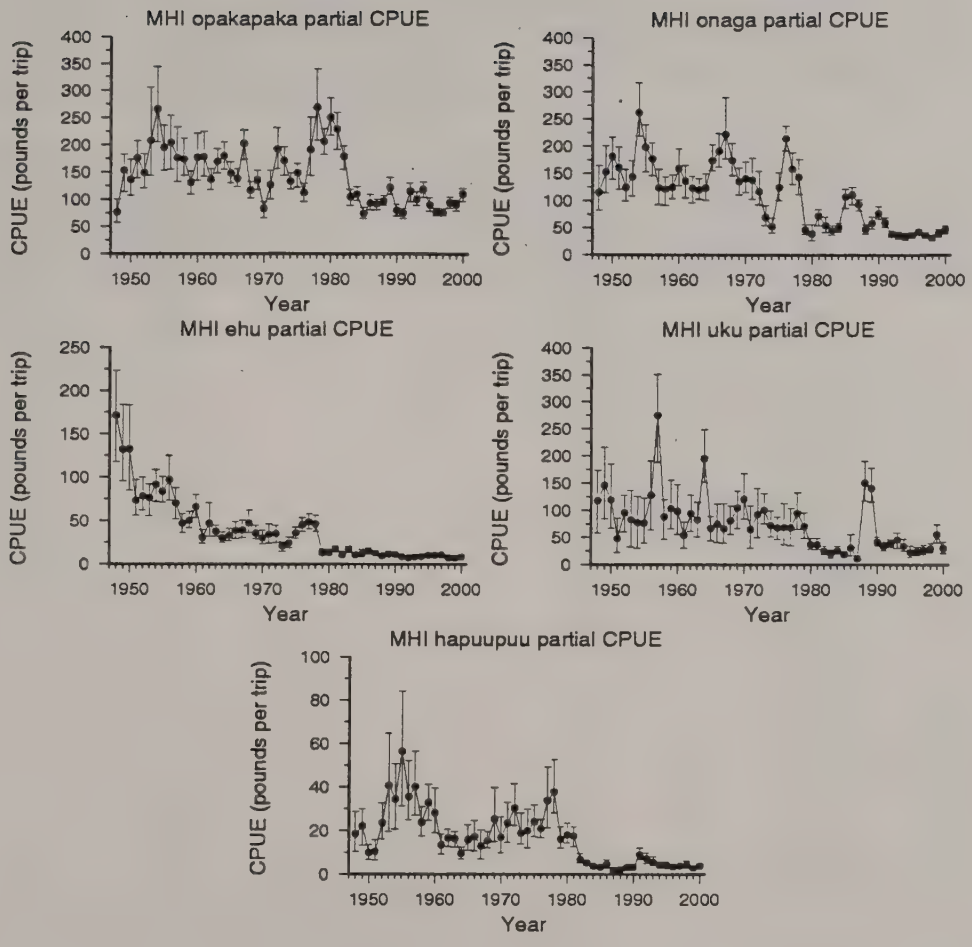


Figure 14b. data summary:

	MHI Partial CPUE (lb/trip)				
Year	**OPA**	**ONA**	**EHU**	**UKU**	**HAP**
1948	77	115	172	117	18
1949	153	153	132	146	22
1950	135	182	132	119	10
1951	176	161	73	48	11
1952	149	124	78	95	24
1953	208	144	76	82	41
1954	266	262	91	77	35
1955	195	198	83	76	56
1956	204	177	97	127	36
1957	176	124	70	275	40
1958	174	121	47	88	24
1959	130	124	50	103	33
1960	177	158	66	97	28
1961	178	136	31	54	13
1962	136	123	47	94	17
1963	169	120	38	82	16
1964	180	122	30	195	9
1965	148	174	33	67	16
1966	138	191	38	75	17
1967	203	222	39	66	13
1968	116	174	47	81	15
1969	135	135	35	104	25
1970	83	140	30	120	17
1971	127	138	34	65	24
1972	192	116	35	92	31
1973	171	70	21	101	19
1974	132	52	24	72	20
1975	149	124	36	68	24
1976	112	214	45	69	21
1977	191	158	49	67	34
1978	269	143	46	94	38
1979	207	47	13	70	16
1980	251	40	13	37	18
1981	229	72	18	37	18
1982	179	55	11	25	7
1983	104	46	17	20	5
1984	109	51	10	26	4
1985	74	107	12	18	3
1986	93	111	15	31	5
1987	91	93	13	10	2
1988	97	48	9	150	2
1989	122	59	12	140	3
1990	80	77	12	42	3
1991	75	60	9	34	9
1992	115	39	8	39	7
1993	100	37	9	46	6
1994	118	34	9	34	4
1995	96	40	11	26	5
1996	77	43	11	24	3
1997	76	36	11	27	4
1998	95	32	8	29	4
1999	91	41	7	55	3
2000	**110**	**47**	**9**	**30**	**4**
mean	144.11	109.62	39.09	74.83	16.66
s.d	51.42	58.23	35.96	48.53	12.54

Comments: All CPUE time series remain highly variable. All 2000 partial CPUE values are well below their long-term averages. There are apparent declines in most species when comparing several years of recent values with values earlier in the time series. The decline is least apparent in opakapaka and most apparent in ehu.

Source: The partial CPUE for the MHI is based on HDAR C-3 catch report data from commercial fishermen.

Calculation: The same subset of HDAR data as used in Fig. 14-A is used here, but the weight of each species is tabulated separately rather than in aggregate. The same denominator value used in Fig. 14-A is used here (# trips fished), i.e. summing these five partial CPUE's (and remaining BMUS CPUE's) will approximate the Fig. 14-A estimates. 95% non-parametric confidence intervals were calculated by bootstrapping.

Interpretation: Reduction of species-specific CPUE for species presented here, with the exception of opakapaka, to less than half of their early values would suggest a yellow light situation for all of these species. Caution must be used in this interpretation because factors such as targeting of effort to specific species is not taken into account (see next section for targeted effort).

Figure 14c. Partial targeted CPUE for MHI bottomfish

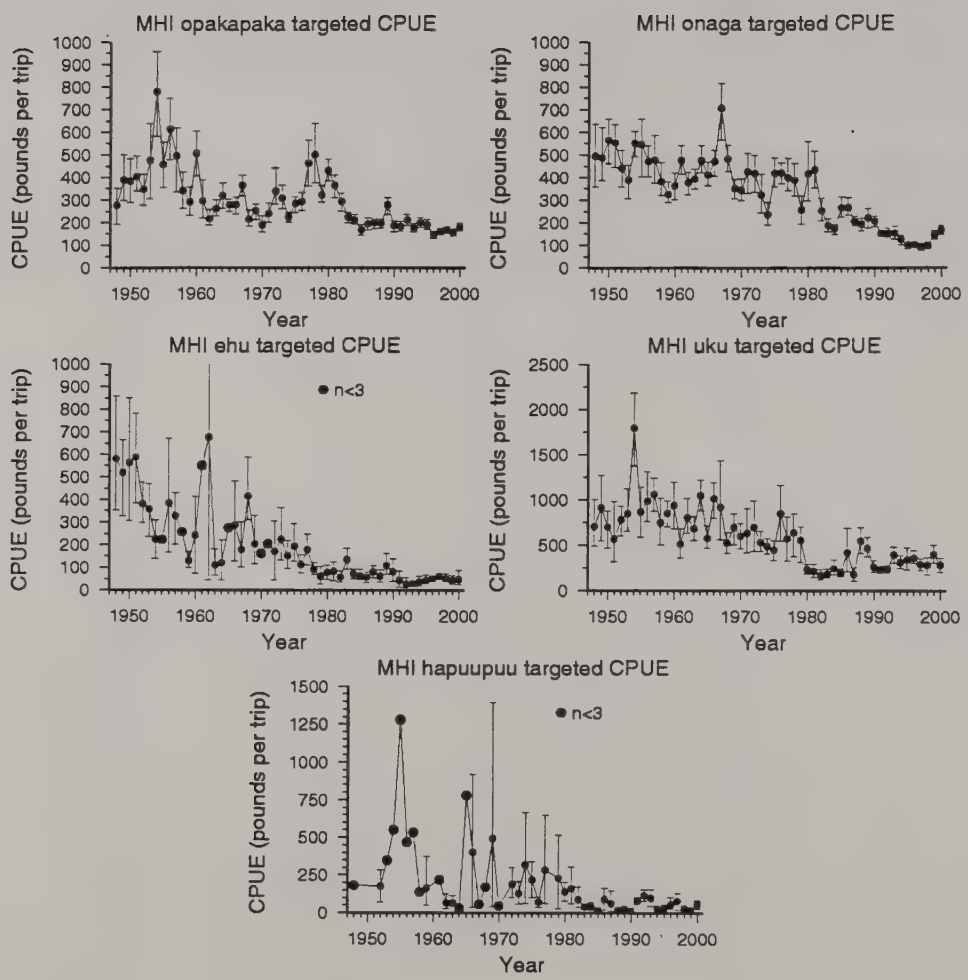


Figure 14c data summary:

	MHI Targeted CPUE (lb/Trip)			
Year	Opakapaka	Onaga	Ehu	Uku
1948	277	496	581	705
1949	391	488	517	913
1950	385	566	564	701
1951	406	554	589	567
1952	348	442	380	779
1953	476	390	358	850
1954	779	552	224	1796
1955	458	547	222	869
1956	613	473	384	988
1957	496	479	327	1061
1958	344	382	257	745
1959	293	325	130	852
1960	507	364	242	939
1961	297	476	550	514
1962	216	379	677	806
1963	263	394	111	683
1964	320	475	120	1046
1965	281	411	275	574
1966	280	472	288	1014
1967	366	706	180	919
1968	215	484	415	525
1969	254	353	203	696
1970	191	345	161	600
1971	241	428	205	634
1972	339	420	171	699
1973	309	324	226	531
1974	225	236	152	488
1975	284	419	194	448
1976	293	421	112	846
1977	462	400	178	573
1978	501	389	92	640
1979	323	255	61	552
1980	430	415	79	235
1981	364	433	83	212
1982	293	252	58	164
1983	225	186	135	179
1984	212	173	72	241
1985	168	266	63	193
1986	194	267	58	418
1987	199	206	82	175
1988	198	192	60	549
1989	278	221	109	468
1990	187	205	82	260
1991	183	153	45	224
1992	212	154	27	238
1993	176	155	28	393
1994	200	125	37	311
1995	191	100	45	343
1996	147	103	51	363
1997	162	89	61	292
1998	166	98	52	283
1999	158	145	44	398
2000	**182**	**167**	**47**	**281**
mean	301.09	338.68	197.43	580.62
s.d.	128.57	149.55	171.28	312.40

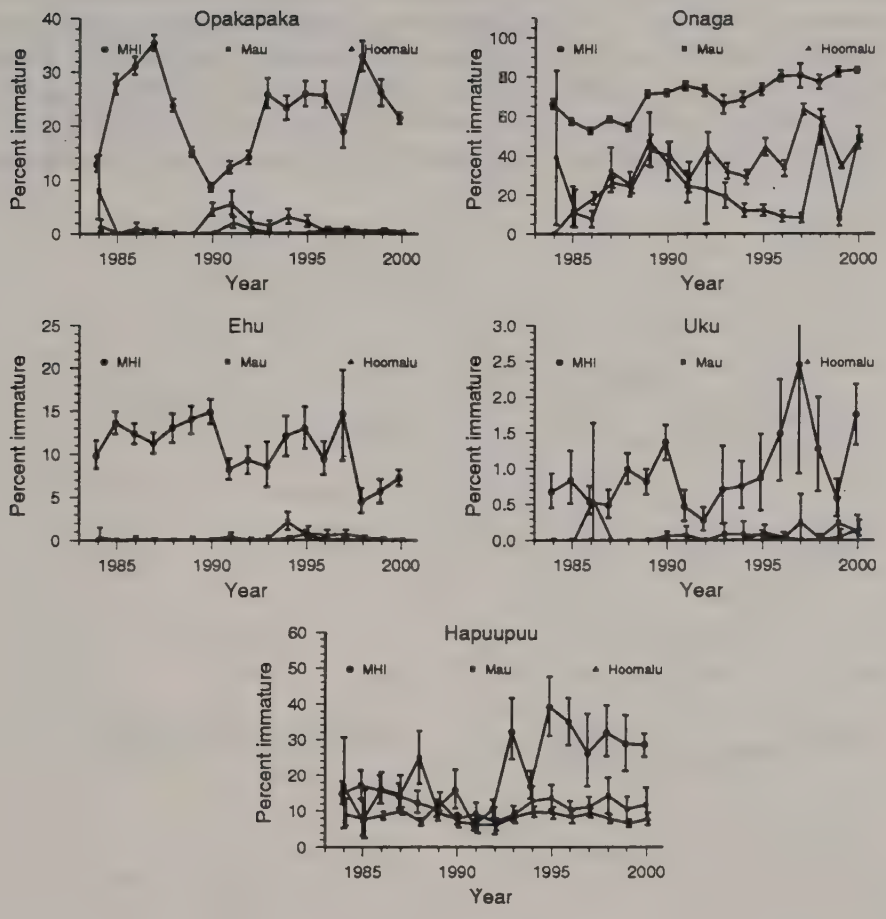
Comments: As in Fig. 14-B, there are apparent declines when comparing recent years with values earlier in the time series. The decline is least apparent in opakapaka (50% of original values) and most apparent for ehu (9% of original values). The level of screening done here severely reduces the size of the sample, and this may contribute to some of the observed variability, particularly for ehu where there are fewer targeted trips. Values for hapuupuu are graphed but not put in the table due to the small numbers of targeted trips in most years.

Source: The partial targeted MHI CPUE is based on HDAR C-3 catch report data from commercial fishermen.

Calculation: The data used in Fig. 14-A were further screened to only include trips where at least 50% of the total catch by weight is the target species. This can only be done for species that are targeted successfully; incidental catch species will not contribute significantly enough to the overall catch. 95% non-parametric confidence intervals were calculated by bootstrapping.

Interpretation: Comparison of 2000 CPUE values with the first 5 years available (1948-52) indicate that all four species for which sufficient data is available have CPUE values less than or equal to 50% of original values. These values represent a yellow light or borderline condition for these four species, with the ehu stocks being the most stressed.

Figure 15. Percent immature in Hawaiian bottomfish catch



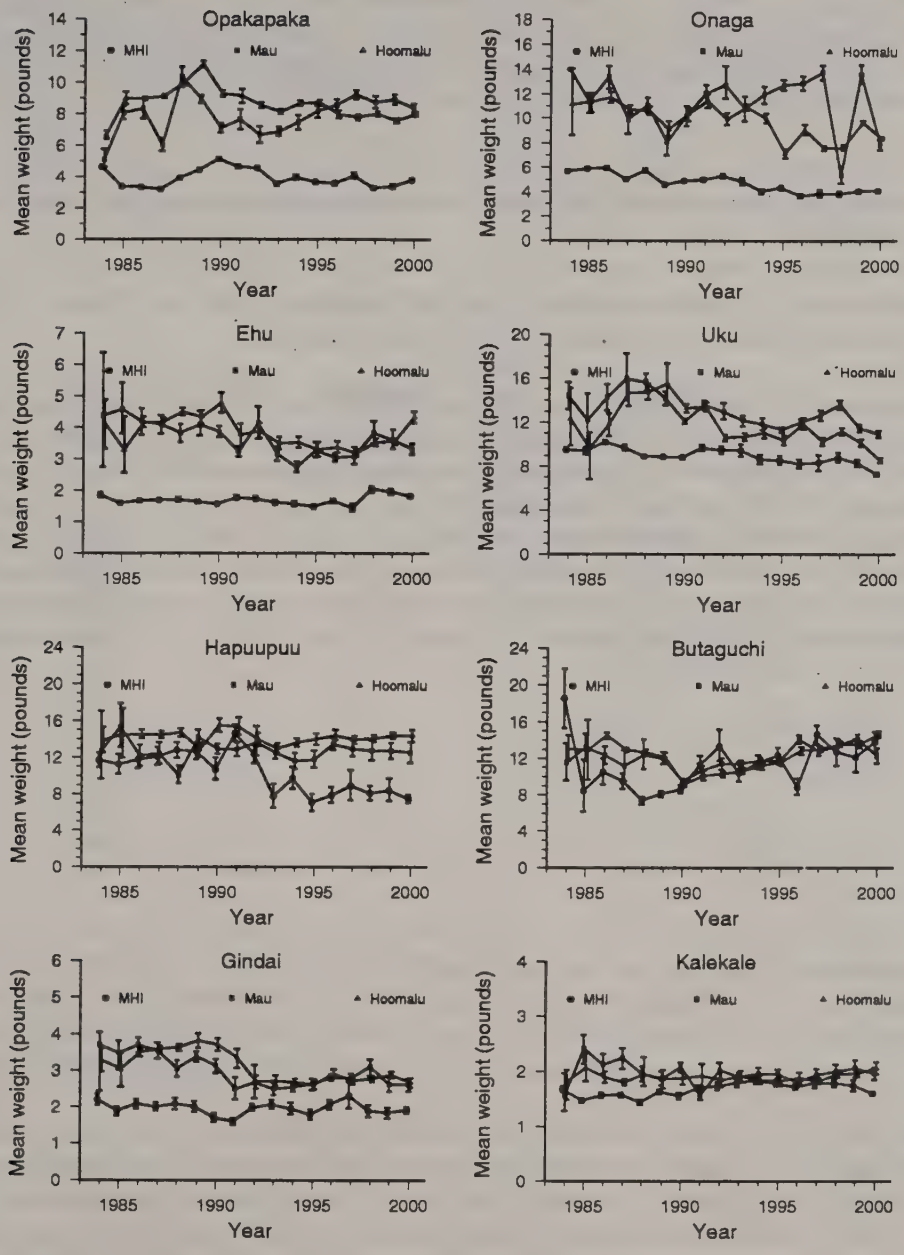
Comments: MHI catch is comprised of more immature fish than NWHI catch for all species. In all areas onaga values are the highest on average. Percent immature for uku are the lowest (i.e. healthiest) values in all zones. Among the other species, MHI opakapaka experienced periods of relatively high values (peaking in the years 1985-87) and a sharp rise in 1998. MHI hapuupuu percent immature declined from a peak in 1995 to moderate levels in 1997-2000.

Source: Prior to 2000 fish size data is derived from auction lot statistics obtained at the Honolulu UFA auction by HDAR, NMFS and WPRFMC personnel. Data for 2000 is from dealer sales records. Size at maturity from Everson (1984), Everson (1990 unpub. rep.), Everson et al. (1989), Kikkawa (1984), Sudekum et al. (1991).

Calculation: The percent immature is calculated in terms of weight. The size distribution of sold fish is assumed to be representative of all fish caught. Maturity was assumed to be "knife-edge", and all fish in the same sales lot were assumed to be of equal size. 95% non-parametric confidence intervals were calculated by bootstrapping.

Interpretation: MHI onaga catch has the highest percentage of immature fish, and is the only one consistently over 50%. In 2000 the MHI onaga landings comprised of 84% immature fish, signifying a yellow light condition for this species in this zone. In the NWHI zones onaga showed high % immature values for 1997 and 1998 in the Hoomalu zone and 1998 in the Mau zone. 2000 values, however, are just below 50% for both zones, a borderline condition. All other MHI and NWHI values are in the healthy range for percentage of immature fish in the catch.

Figure 16. Mean weight of Hawaiian bottomfish



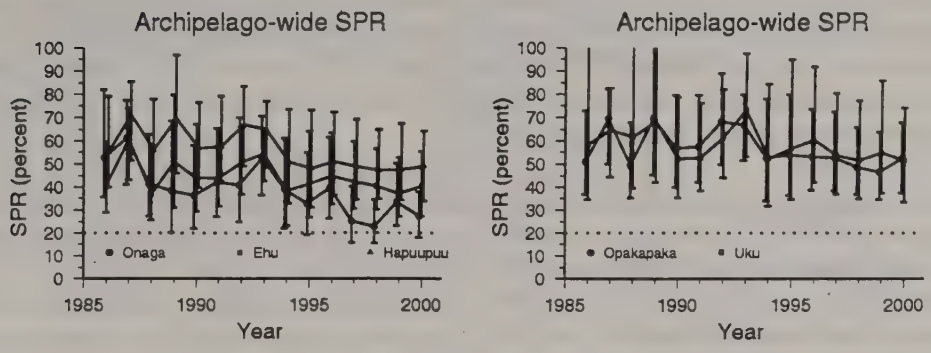
Comments: Mean weights of fish in the NWHI catch appear generally stable over time, with the notable exception of the onaga mean weight, where recent declines can be seen for both the Mau and the Hoomalu zone. The 1998 Mau onaga value is the lowest on record showing a sharp decline from earlier values with a return to normal levels in 1999 then another drop in 2000. MHI values have been remarkably stable for most species over the time series available, with continuously decreasing sizes found only in the MHI onaga and this decline is very gradual. MHI hapuupuu mean weight has remained relatively stable after a drop in mean size starting in 1993. The two most important changes in 2000 are the return to low mean size of the Mau zone onaga and a third year of elevated size in the MHI ehu.

Source: Prior year's fish size data was derived from auction lot statistics obtained at the Honolulu UFA auction by HDAR, NMFS, and WPRFMC personnel; 2000 data is from HDAR dealer reports.

Calculation: The size distribution of sold fish is assumed to be representative of all fish caught. All fish in the same sales lot were assumed to be of equal size.

Interpretation: MHI mean weights are considerable lower than NWHI weights indicating considerable stress on these resources. No noticable trends can be seen in NWHI mean weights, indicating relative health in these zones. Low mean weights were first recorded for MHI hapuupuu in 1993 and have remained low through the present. The small number of fish upon which the annual estimates are based may bias the result. However, with so many years in a row recording low mean weights, it is likely that marketed fish size has actually declined for MHI hapuupuu. Such a decline in mean size indicates increased stress on the MHI hapuupuu resource. These values do not exhibit a continuing decline, in fact, the 1997-2000 values are slightly greater than the 1995 lowest value.

Figure 17. Archipelago-wide Spawning potential ratio (SPR)



Archipelago-wide SPR:

			SPR (%)		
Year	**Ehu**	**Hapuupuu**	**Onaga**	**Opakapaka**	**Uku**
1986	41	55	53	51	58
1987	61	71	61	69	65
1988	37	56	42	49	62
1989	51	70	38	69	68
1990	44	57	36	57	52
1991	44	58	42	57	53
1992	51	67	41	68	61
1993	54	65	53	67	73
1994	38	51	39	53	52
1995	41	48	33	54	56
1996	45	51	40	53	60
1997	42	49	25	53	54
1998	40	47	23	49	51
1999	37	48	34	46	55
2000	**40**	**49**	**27**	**52**	**52**
mean	44.40	56.13	39.13	56.47	58.13
s.d.	6.94	8.39	10.58	7.89	6.62

Source: Data used in calculating archipelago-wide SPR is derived largely from HDAR commercial catch records integrated with NMFS interview data in some cases. Also important is the size frequency data obtained from market sampling by HDAR and NMFS and dealer reports. The final component is the weighting factor for each management zone, which is based on the percentage of total 100 fathom contour contained in each zone.

Calculation: Calculations use similar methodology as presented in Somerton and Kobayashi (1990) for dynamic SPR. Preweighted SPR values (point estimates and upper and lower bounds) are from the area specific estimates found in the following section (Figure 18, 18a, b, and c). NWHI estimates are calculated using area specific maturity estimates and partial CPUE values (where area specific landings of each species are divided by the total effort expended in the management zone). For the MHI, hapuupuu SPR estimates are calculated similarly to those for

NWHI fish. For the remaining MHI species, however, targeted trips are identified and the landings and effort for these targeted trips only are used to calculate CPUE for these species. Weighting factors are applied to point estimate and upper and lower bounds for each species and management zone. Archipelago-wide values are derived by adding the zone specific components. The weighting factors are: MHI = 0.447, Mau zone = 0.124, Hoomalu zone = 0.429. Additionally, MHI values are weighted by model predicted increases in abundance due to State closed areas (12.4% increase for 1999).

Interpretation: SPR values for the five major BMUS species are all above the 20% critical threshold level when viewed on an archipelago-wide basis. Of these species, onaga usually has the lowest value with the 2000 value at 27%. This low value for onaga is due to the consistently poor condition of the resources in the MHI. Now that the state management plan for the MHI bottomfish has been implemented, it is likely that the condition of onaga resources in this area will improve and the archipelago-wide SPR value will increase over time.

The archipelago-wide SPR estimates are the best method available to assess the Hawaii bottomfish resources and should be the only values used to evaluate overfishing. SPR values are also presented in this document on a management zone basis for the purpose of determining locally depleted resources. It is the best policy to have all zones in a healthy condition and actions should continue to be implemented to assure the achievement of this goal. For the purpose of determining an overfished resource, however, the archipelago-wide condition is what should be measured. Evidence from larval drift simulation and preliminary genetic work point to as single archipelago-wide stock with substantial larval transfer between zones (generally from the more healthy northwestern zones toward the more depleted MHI zone).

Comments: SPR values for all species fluctuate annually and have wide error bars. There are no particularly obvious trends in SPR values over the 15 year period of data. The only species showing current signs of concern is the onaga for which the lower bound is below the 20% critical threshold value. The management measures implemented by the state for the MHI should bring improvement of the MHI onaga resource over a period of a few years. Any improvements to the MHI resources will contribute to improvement of the archipelago-wide condition as well.

Figure 18. Spawning potential ratio (SPR) for MHI bottomfish

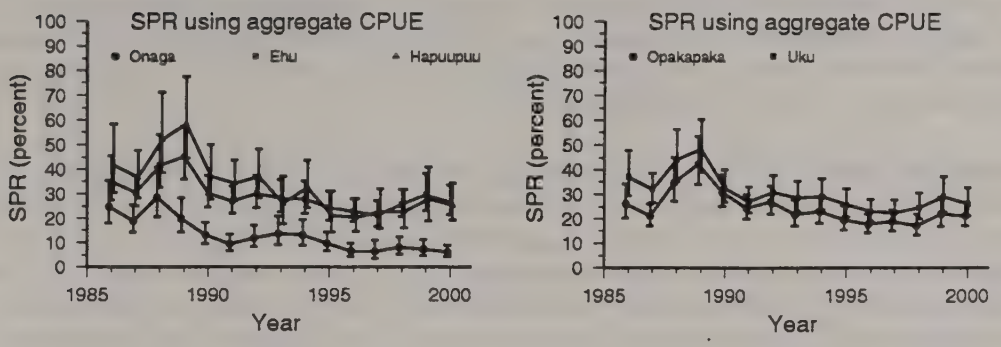


Figure 18. data summary:

			SPR (%)		
Year	**Ehu**	**Hapuupuu**	**Onaga**	**Opakapaka**	**Uku**
1986	35	42	25	26	37
1987	31	37	19	21	32
1988	42	52	29	35	44
1989	45	58	20	42	48
1990	30	37	13	31	33
1991	27	34	9	24	27
1992	30	37	12	27	31
1993	28	26	14	22	29
1994	28	33	13	23	29
1995	24	21	10	20	26
1996	23	20	6	18	23
1997	21	23	6	19	22
1998	26	23	8	17	25
1999	30	28	7	22	29
2000	**26**	**25**	**6**	**21**	**26**
mean	29.73	33.07	13.13	24.53	30.73
s.d.	6.60	11.23	7.17	6.84	7.35

Comments: Current SPR estimates for onaga in the MHI is below the twenty percent critical threshold level indicating localized resource depletion. Onaga remains below 20% for the eleventh year in a row.

Source: SPR is estimated from the Honolulu UFA auction size frequency data collected by HDAR, NMFS, and WPRFMC personnel; CPUE estimates from C-3 form data reported to HDAR by commercial fishermen. Additional information for opakapaka obtained from size frequency data of fish caught from the R/V Townsend Cromwell.

Calculation: Calculations use similar methodology as presented in Somerton and Kobayashi (1990) for dynamic SPR. Virgin CPUE estimate is 1948-1952 mean; current CPUE estimate is a single year estimate. CPUE is of aggregate bottomfish from the areas of Maui, Lanai, Molokai,

and Penguin Banks (see Fig. 14-A for more details). Virgin catch size composition is estimated from the 1986-1988 NWHI catch data, and current catch size composition is estimated from single year MHI catch data. All SPR values may have changed slightly from previous year's reports due to more complete reporting and improvements in the calculations. The 90.25% non-parametric confidence intervals were constructed based on "best" and "worst" case bounds of SPR components (CPUE and percent immature).

Interpretation: The peak SPR values observed in 1988-1989 for all species were largely a response to increases in aggregate CPUE due to increased uku landings and catch rates. 2000 SPR values show improvements over low values for all five major BMUS species in 1997. The improvement is largely due to an increase in aggregate CPUE over the low 1997 value. The 2000 value presented here for MHI hapuupuu is the best estimate of MHI SPR available, because we cannot calculate an SPR for this species using targeted CPUE. For the remaining species, the next section (Figure 19-A) gives the best estimation of 2000 MHI SPR.

Figure 18a.. Spawning potential ratio (SPR) for MHI bottomfish using targeted CPUE

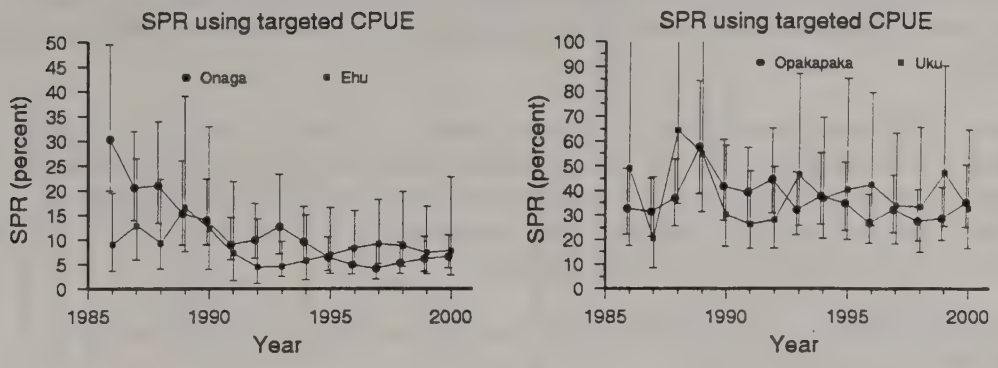


Figure 18a data summary:

	SPR (%)			
Year	**Opakapaka**	**Onaga**	**Ehu**	**Uku**
1986	32.71	30.37	8.99	49.11
1987	31.43	20.60	12.91	20.57
1988	36.88	21.03	9.30	64.24
1989	57.60	15.31	16.54	54.86
1990	41.73	13.86	12.32	30.29
1991	39.18	8.99	7.23	26.37
1992	44.41	9.95	4.37	28.01
1993	31.93	12.65	4.56	46.13
1994	37.48	9.49	5.76	36.51
1995	34.59	6.34	6.85	40.17
1996	26.96	4.81	8.16	41.15
1997	32.00	4.11	9.16	33.69
1998	27.28	5.27	8.75	33.04
1999	28.40	6.12	7.36	46.74
2000	**34.85**	**6.60**	**7.76**	**32.59**
mean	35.83	11.70	8.67	38.90
s.d.	7.86	7.47	3.23	11.69

Comments: Targeted SPR values are available for only four of the BMUS species present in the MHI. As expected onaga and ehu values are below the 20% critical level and have been for many years. Opakapaka SPR values are higher using targeted CPUE compared to using aggregate CPUE.

Source: SPR values are estimated using dealer reports; the Honolulu UFA auction size frequency data collected by HDAR, NMFS, and WPRFMC personnel; CPUE estimates from C-3 form data reported to HDAR by commercial fishermen and screened for trips targeting particular species. Additional information for opakapaka was obtained from size frequency data of fish caught from the R/V Townsend Cromwell.

Calculation: Calculations are conducted as in the previous section with targeted CPUE substituting for aggregate CPUE.

Interpretation: We feel that SPR values obtained here may better represent the condition of the MHI resources in regards to localized depletion than those found in the previous section. Ehu and onaga stocks are clearly stressed and well below the 20% SPR threshold, with ehu below the 20% level for the duration of our data and onaga on a continuing downward trend with values below 20% for the last12 years. Recent small increases in onaga and ehu SPR values are encouraging. Contrary to the results obtained in the previous section, opakapaka and uku SPR levels have remained above the 20% mark for all years sampled and do not indicate critical locally depleted conditions.

Figure 18b. Spawning potential ratio (SPR) for NWHI bottomfish

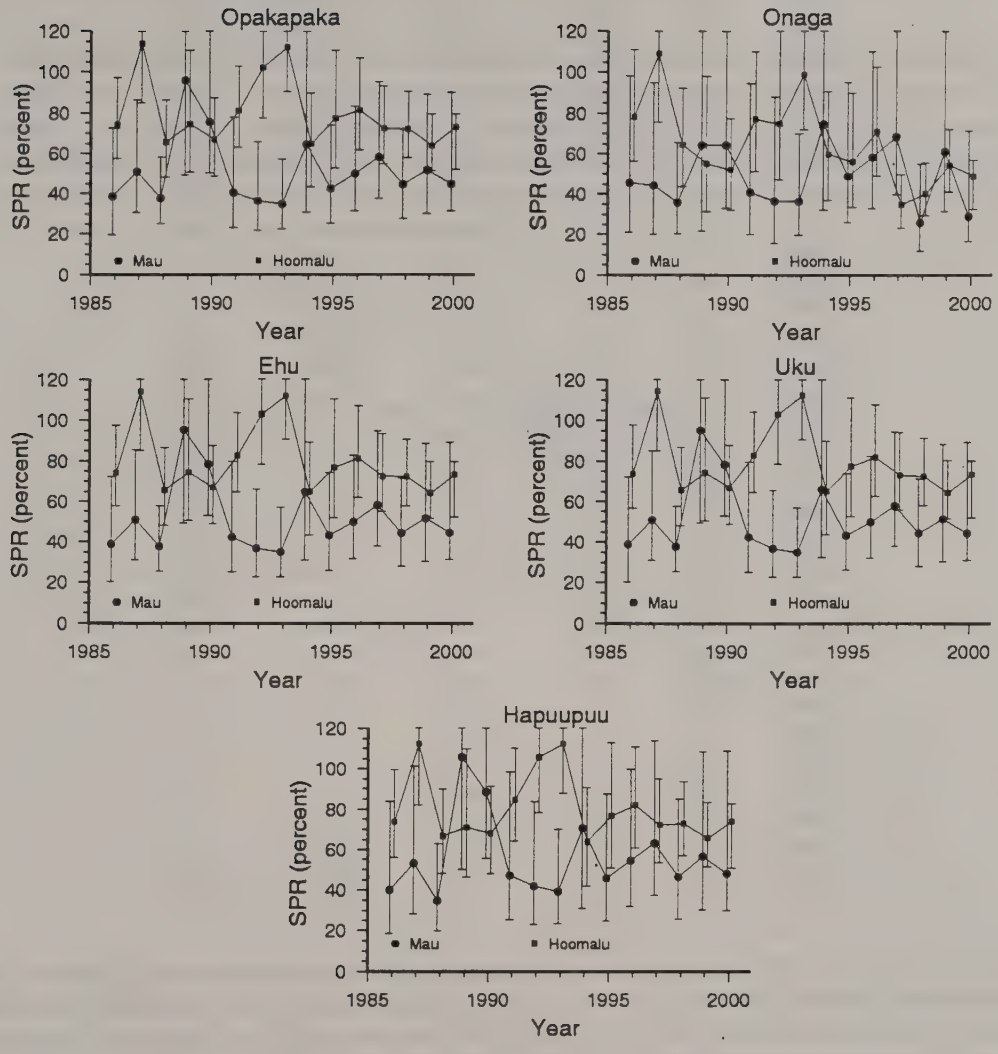


Figure 18b. data summary:

SPR (%)					
Mau Zone					
Year	**Ehu**	**Hapuupuu**	**Onaga**	**Opakapaka**	**Uku**
1986	39	40	46	39	39
1987	51	53	44	51	51
1988	38	35	36	38	38
1989	95	106	64	96	95
1990	78	89	64	75	78
1991	42	47	41	40	42
1992	37	42	36	36	37
1993	35	39	36	35	35
1994	65	71	75	64	66
1995	43	46	49	43	43
1996	50	55	58	50	50
1997	58	63	68	58	58
1998	44	47	26	44	44
1999	52	57	61	52	51
2000	**45**	**48**	**29**	**45**	**44**
mean	51.47	55.87	48.87	51.07	51.40
s.d.	16.7	19.61	15.23	16.66	16.79
Hoomalu Zone					
1986	74	74	78	74	74
1987	114	112	109	114	114
1988	66	67	65	66	66
1989	74	71	55	74	74
1990	67	68	52	67	67
1991	83	85	77	81	83
1992	103	106	75	102	103
1993	112	112	99	112	112
1994	65	64	60	65	65
1995	77	77	56	77	77
1996	81	82	71	81	81
1997	72	72	35	72	73
1998	72	73	40	72	73
1999	64	66	54	64	64
2000	**73**	**74**	**49**	**73**	**73**
mean	79.80	80.20	65.00	79.60	79.93
s.d.	16.52	16.46	20.39	16.40	16.46

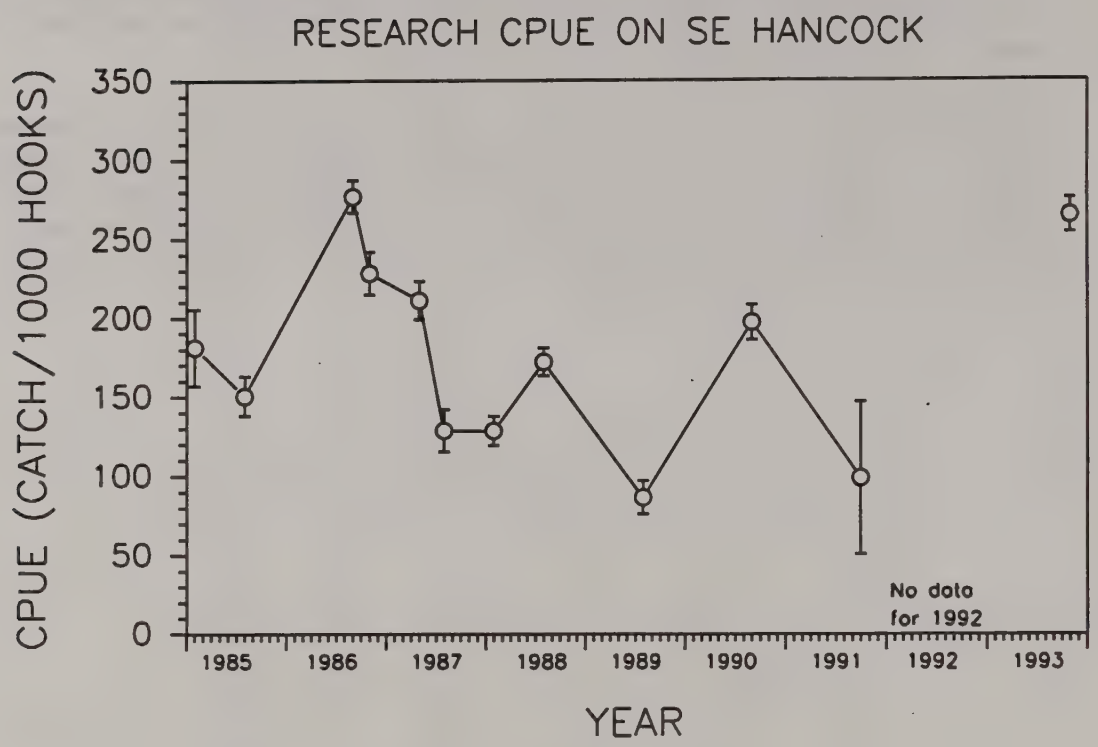
Comments: Current SPR estimates for all five species in both zones are above the 20% critical threshold level indicating healthy resources on a local scale, though lower confidence limits often are near or slightly below this level. Mau Zone SPR estimates tend to be lower than Hoomalu Zone SPR estimates for most species, and onaga SPR estimates tend to be slightly lower than those for most other species in most years. Notable increases in 1999 onaga SPR values for the Mau and Hoomalu zones are due to decreases in the percent of immature onaga in the catches of these zones.

Source: SPR estimated from Dealer reports or Honolulu auction size frequency data collected by NMFS personnel, and CPUE estimates from data reported to HDAR by commercial fishermen. **Calculation:** Calculations use same methodology as presented in Somerton and

Kobayashi (1990) for dynamic SPR. Virgin CPUE estimate is 1948-52 mean; current CPUE estimate is a single year estimate. CPUE is of aggregate bottomfish calculated separately for Mau and Hoomalu Zones. Virgin catch size composition is estimated from the 1986-88 NWHI catch data, and current catch size composition is estimated from single year catch data. All SPR values changed slightly from previous year's reports due to improvements in the calculations. 90.25% non-parametric confidence intervals were constructed based on "best" and "worst" case bounds of SPR components (CPUE and percent immature).

Interpretation: The correlation of SPR values among species is due the high dependence of SPR on the CPUE component, given that the maturity component is nearly negligible for most species. All species utilize the same aggregate bottomfish CPUE component. The maturity component is small relative to MHI SPR calculations because 1) the NWHI catch is primarily mature fish, and 2) the current catch size composition is relatively unchanged from the best estimate of the virgin catch size composition.

Figure 19. Research CPUE on SE Hancock Seamount



Data Source: Figure 19 presents CPUE based on research longline catches at Southeast (SE) Hancock Seamount by NMFS, Honolulu personnel aboard NOAA ship R/V *Townsend Cromwell*. Vertical bars represent the 95% confidence intervals about the mean CPUE. The CPUE derived from the September 1991 stock assessment survey was computed using data from only the first 5 bottom longline sets as opposed to the standard 40 sets used on all other research surveys. The armorhead population at SE Hancock Seamount was not assessed in 1992 and post-1993 and therefore no current CPUE estimates are available. The last stock assessment survey for armorhead at SE Hancock Seamount was conducted in October 1993. Future NMFS armorhead stock assessment cruises to SE Hancock Seamount are unlikely. Henceforth, annual armorhead SPR values for Colahan Seamount (located outside the U.S. EEZ) will be provided to serve as a relative indicator of armorhead stock levels at the Hancock Seamounts (see explanation in Calculations & Adjustments subsection of ARMORHEAD SPAWNING POTENTIAL RATIO section).

Calculations: Fishing gear and sampling methods utilized during armorhead stock assessment surveys at SE Hancock Seamount are described in Somerton and Kikkawa (1992; Fishery Bulletin, U.S. 90:756-769). The seamount is divided into quadrants and effort is portioned equally among quadrants. Within each quadrant, effort is conducted over four depth strata (<265 meters (m), 265-300 m, 301-400 m, and 401-500 m). CPUE is calculated as a depth stratified average. Based on gear comparison studies of fishing droppers with and without hook timers conducted on the August 1990 survey, new coefficients accounting for the negative effects of hook timers were computed and applied to the catches obtained on all SE Hancock research surveys since 1985.

Interpretation: The fluctuations in CPUE shown in Figure 19 are apparently the result of episodic recruitment followed by high natural mortality. These peaks in CPUE correspond to years (1986 and 1990) where an appreciable proportion (at least one-third) of the armorhead population consisted of fat individuals (fatness index $\geq$0.26) considered new recruits to the seamount population. Fatness index is defined as body depth divided by fork length. Subsequent to recruitment individuals cease somatic growth and over the course of 3-4 years, survivors decline in fatness index and weight. Without subsequent recruitment to the population in suceeding years, the armorhead population as a whole would decline both in numbers (natural mortality) and in biomass (natural mortality and declining fatness index of survivors). The high 1993 CPUE is unusual, however, since fat individuals (new recruits) account for <15% of the 1993 population while leaner individuals (<0.23 in fatness index) form the bulk of the population. These results apparently indicate that the 1993 population is primarily derived from recruitment which occurred either in late 1991 or during 1992. Previous work indicates that little if any annual recruitment to SE Hancock Seamount occurs after the summer months (Humphreys et al. 1993; Fishery Bulletin, U.S. 91:455-463). Since the 1991 stock assessment survey coincided with the end of the summer season, the increase in CPUE at SE Hancock for 1993 is most likely due to good recruitment during 1992. The sharp increase in the 1992 CPUE among seamounts outside the U.S. EEZ implies that a high recruitment occurred (across all seamounts) in 1992.

Tabulated Values:

MONTH/YEAR	ARMORHEAD CPUE
JAN 1985	181.28
JUN 1985	150.51
AUG 1986	276.80
OCT 1986	228.03
APR 1987	210.98
AUG 1987	128.73
JAN 1988	128.77
JUL 1988	172.14
JUL 1989	86.69
AUG 1990	197.08
SEP 1991	98.97
1992	(unknown)
OCT 1993	264.85
1994	(unknown)
1995	(unknown)
1996	(unknown)
1997	(unknown)
1998	(unknown)
1999	(unknown)
2000	(unknown)

Figure 20. Armorhead Spawning potential ratio

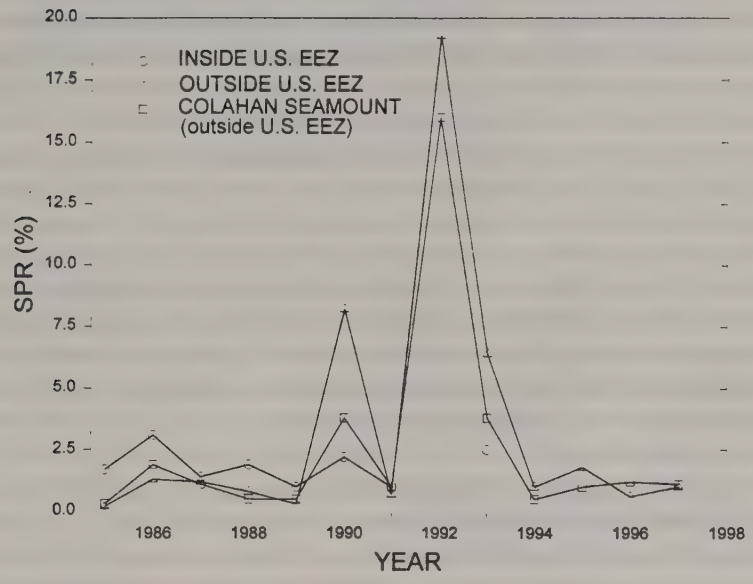
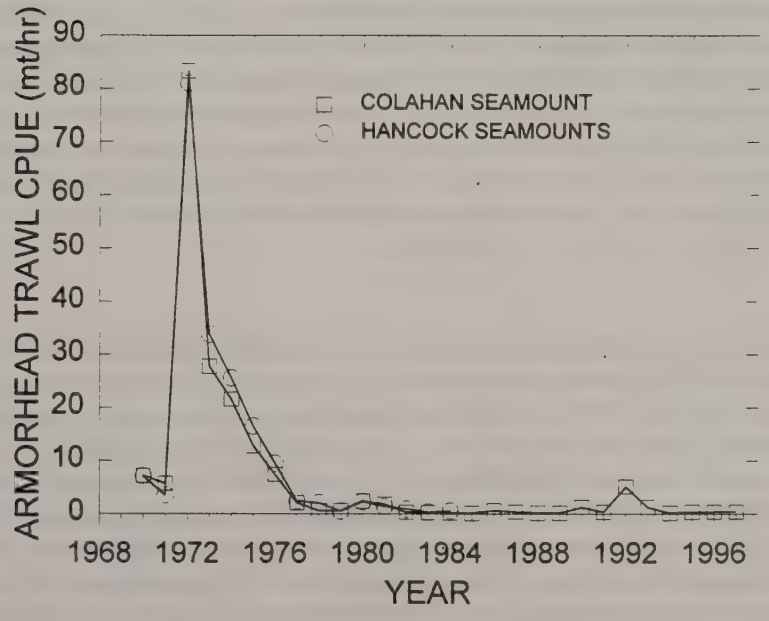


Figure 21. CPUE for Hancock and Colahan Seamounts



Data Source: SPR values for seamounts outside the U.S. EEZ are based on reported catch and effort data from the Japanese trawler fleet and values for seamounts within the U.S. EEZ (Hancock Seamounts) are based on research longline CPUE in addition to the trawl CPUE. However, with the cessation of research longline cruises to the Hancock Seamounts, SPR values for Colahan Seamount (comparable in size and located closest to the Hancocks among seamounts outside the U.S. EEZ) are being provided now and in the future as an indicator of stock levels at the Hancock Seamounts. SPR values for Colahan Seamount are also based on reported catch and effort data at that seamount by the Japanese trawler fleet.

Calculations: SPR values outside the U.S. EEZ are computed as the current year CPUE divided by the average CPUE during the first three years of the fishery (1970-1972). SPR values inside the U.S. EEZ are computed as the estimated biomass on SE Hancock Seamount divided by the 1970-1972 average biomass. Biomasses are estimated using procedures described in Somerton and Kikkawa (1992). The SPR values for Colahan Seamount are computed as the current year CPUE divided by the average CPUE during the first three years of the fishery (1970-1972) at Colahan Seamount (Figure 20). Fishery catch and effort data by seamount by month for seamounts outside the the U.S. EEZ have been provided annually since 1980 by colleagues at the National Research Institute for Far Seas Fisheries in Shimizu, Japan.

The decision to use SPR values for Colahan Seamount (instead of the overall outside U.S. EEZ values) as an indicator of armorhead stock conditions inside the U.S. EEZ (i.e., Hancock Seamounts) is based on the greater similarities between these seamounts. Aside from Colahan Seamount, the seamounts fished for armorhead outside the U.S. EEZ are Milwaukee Seamounts and Koko Seamount. These latter seamounts have summit areas of 67 and 564 nm^2 and average summit depths of 190 and 170 fm, respectively, while Colahan and the Hancock Seamounts have much smaller summit areas (about 1.4 nm^2) and shallower summit depths (141-150 fm). Fishing effort by the Japan trawl fleet has historically been different at these two types of seamounts. Koko and Milwaukee Seamounts have always received the majority (about two-thirds) of the annual total trawling effort and were typically fished intensively over a sustained period of time. However, the fishing effort at Colahan and the Hancock Seamounts was applied in pulses since catch levels could not be sustained for more than several days without a "cooling off" period. These similarities plus the historical close coincidence between Colahan and Hancock Seamounts in temporal profiles of armorhead CPUE from the Japan trawl fleet (Figure 21) indicate that SPR values for Colahan Seamount should provide the best future indicator of armorhead stock levels at the Hancock Seamounts.

Interpretation: SPR within the region outside of the U.S. EEZ, which historically (Japan trawl fleet during the 1969-1981 period) contributed 91% of the total catch of armorhead, is 1.0%; based on the most current (1997) available catch and effort statistics from the Japan North Pacific trawl fishery. The 1996 SPR of 0.4% in last year's report was incorrect; the correct value (0.6%) however was only slightly higher. These low SPR values for the last two years of data indicate a continued depression in stock levels since the dramatic increase of SPR levels outside the U.S. EEZ in 1992 and the equally dramatic decline and continued low levels since then. This continuation of low stock levels outside the U.S. EEZ is interpreted to be a result of the intensive fishing effort on the high 1992 recruitment pulse coupled with little subsequent

recruitment during 1993-1997 to compensate for losses due to fishing and natural mortality. Based on previous trends, catch levels are expected to remain low in 1998 unless offset by a large recruitment event.

Based on current estimates of a 2-2.5 year pelagic phase prior to seamount recruitment, the 1992 recruitment would have originated from the 1989-1990 winter spawning season. If this is correct, then the large 1992 recruitment originated from a parental stock which in 1989 had one of the lowest SPR values both inside and outside the U.S. EEZ (see table next page). This would appear to support the notion that dramatic increases in armorhead abundance across the seamounts are episodic and the product of environmental factors rather than simply a stock-recruitment relationship.

During February-March 1997, an oceanographic and larval armorhead survey over the seamounts outside the U.S. EEZ was conducted onboard the R/V *Kaiyo Maru* by the National Research Institute of Far Seas Fisheries Laboratory in Shimizu, Japan. Initial plans were to include research trawl hauls over Colahan Seamount, however, the ship was no longer equipped to conduct bottom trawl operations. Armorhead larvae were collected from surface waters around the Milwaukee Seamounts group, Colahan and C-H Seamount, but were absent from Koko Seamount. This same vessel conducted a research survey of pelagic stage armorhead in open ocean waters of the North Pacific during November 1998. The major objective was to tag-and-release pelagic specimens from various locations distant from the seamounts in hopes of later obtaining seamount re-captures and movement data. Unfortunately, no pelagic stages of armorhead were encountered during this cruise.

Management Measures: Effective September 1, 1998, the fishing moratorium on seamount groundfish at the Hancock Seamounts was extended for a third 6-year period until August 31, 2004. Based on current sustained low SPR values both at Colahan Seamount and at all SE-NHR seamounts outside the U.S. EEZ, it was inferred that the status of the Hancock Seamounts armorhead resource was similarly depressed. The intent of the moratorium is to provide continued long-term protection (which is absent elsewhere within the seamount habitat of the SE-NHR) to enhance the possibility of the armorhead resource to re-build via recruitment.

Tabulated Values:

ARMORHEAD SPR (%)

YEAR	INSIDE US EEZ	COLAHAN	OUTSIDE US EEZ
1985	1.7	0.3	0.2
1986	3.1	1.9	1.3
1987	1.4	1.1	1.2
1988	1.9	0.5	0.8
1989	1.0	0.5	0.3
1990	2.2	3.8	8.2
1991	1.0	1.0	0.7
1992	NA	16.0	19.3
1993	2.5	3.8	6.4
1994	NA	0.5	1.0
1995	NA	1.0	1.8
1996	NA	1.2	0.6
1997	NA	1.1	1.0
1998	NA	NA	NA
1999	NA	NA	NA
2000	NA	NA	NA

Appendix 4

Commonwealth of the Northern Mariana Islands

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Summary

Landings of bottomfish seem to have significantly dropped from last year (18.2% fewer pounds in 2000 than in 1999), although they remain 23.5% higher than the 18-year mean. In 1999, bottomfish landings also decreased, but by a much smaller percentage (3.1% less than 1998). From the high landings documented from 1996–1997, it appears that bottom-fishing activity in the CNMI has declined over the last 4 years. The causes of this decline are unknown, but a two of factors certainly contributed. These were changes in the high liners participating in the fishery, and an increased number of local fishermen focusing on reef fishes in preference to bottomfishes.

Domestic US, joint-venture, and foreign vessels continue to inquire about full-time bottom fishing throughout much of the CNMI. The impact of these ventures to the commercial market is still unclear despite a fish-market assessment study conducted in 1994, and completed in late 1996. The results of this study did not correspond with the significant increase in the Northern Islands bottomfish harvest.

The number of large-vessel commercial bottom-fishing ventures active in the Northern Islands appeared to increase to six during 2000, but only four were active for more than a few trips. Of these four, two primarily sold their catches off the island of Saipan (mostly to the large hotels in Tinian). Another two large vessels are beginning to enter the fishery in 2001. Commercial trips made by these large vessels continue to be sampled on a monthly basis.

Revenues and prices for bottomfishes fell dramatically in 2000, to the lowest average price per pound (adjusted) in 7 years. Only 2 years in the last 18 have lower values. Prices fell for all groups (from 8¢ to $1.25 per pound) from last year, with the exception of emperor (mafute'), which increased by 14¢ per pound. Deep-water snappers still command the best prices, but the range is narrowing. Fishermen utilizing larger vessels will have greater access to these deepwater resources, especially in the Northern Islands of the CNMI. Subsequently, the market demand should continue to increase as long as the supply of these fish increases with consistent quality. This industry could continue to expand with potential support by a training program in bottom fishing that addresses the following; proper fish handling, use of fathometers, nautical charts, modern electronic equipment such as GPS, fish finders, electric reels, anchoring techniques, and marketing.

With the potential expansion of biological data collection from the bottom fishery (as well as DFW fishing surveys), an assessment with the aid of the National Marine Fisheries Service should be completed for the bottomfish stocks surrounding Saipan, Tinian, and Rota. After identifying the extent of resource utilization, additional data collecting could be used to help determine comprehensive management strategies. Continued sampling of vessels bottom fishing plus actual fishing by DFW in the Northern Islands of the CNMI will provide useful estimates of CPUE.

Historical Annual Statistics for CNMI Bottomfishes

Year	Total Landings (lbs)	CPUE (lb/trip)	Inflation-adjusted Revenue ($)	Average Price (per lb)	Number of Boats
1983	22,683	43	77,606	3.42	90
1984	33,924	69	105,029	3.10	102
1985	32,780	116	95,281	2.91	55
1986	23,929	104	75,282	3.15	54
1987	39,772	168	114,989	2.89	42
1988	37,850	179	104,959	2.77	29
1989	19,550	76	59,586	3.05	29
1990	10,903	85	36,063	3.31	29
1991	5,693	46	20,470	3.60	20
1992	8,148	58	24,607	3.02	38
1993	14,769	83	41,787	2.83	20
1994	20,363	74	61,481	3.02	32
1995	28,744	93	102,827	3.58	33
1996	52,967	119	183,775	3.47	69
1997	50,851	136	173,957	3.42	68
1998	45,835	145	160,944	3.51	50
1999	44,415	157	164,227	3.70	50
2000	**36,343**	**58**	**103,477**	**2.85**	**64**
Mean	29,418	101	94,797	3.20	49
Standard Deviation	14,540	42	50,801	0.30	23

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Introduction

The Commonwealth of the Northern Mariana Islands' (CNMI) bottomfish fishery occurs primarily around the islands and banks from Rota Island to Zealandia Bank north of Sarigan. However, this discussion will be limited to the catches landed on Saipan, which is by far the largest market. The fishery will be characterized by data collected through the Commercial Purchase Database, which indirectly records actual landings by recording all local fish sales to commercial establishments. This data collection system is dependent upon first-level purchasers of local fresh fish to accurately record all fish purchases by species categories on specially designed invoices. Division of Fish and Wildlife (DFW) staff routinely collected and distributed invoice books to 50 participating local fish purchasers in 2000; which include practically all fish markets, stores, restaurants, hotels, government agencies, and roadside vendors (fish-mobiles). Although this data collection system has been in operation since the mid-1970s, only data collected since 1983 are considered accurate enough to be comparable for most aspects of the fishery. Unfortunately, this database has 3 inherent problems, when used in this manner. First, a number of the bottomfish MUS are not listed on the sales receipts. This in turn results in a series of problems. This means that buyers must either write in a species name or decide within which general category that species falls. For example, *Lutjanus kasmira* may be written in as *saas* (the local name for the species), or the vendor must decide whether or not it should be included in "assorted bottomfish" or in "assorted reef fish." Given that this species is also a common reef inhabitant and may be caught while reef fishing, it is entirely possible that it will be included with the reef fishes and underrepresented in the bottom fishes. In addition, for those species that are correctly categorized as "assorted bottomfish," but not listed by the buyer to species, the species-specific totals may vary widely from year to year and under represent the sales of that species. *Etelis carbunculus* (*ehu*) is such a species. Unless the buyer specifically writes it on the invoice, sales of this species are likely to inflate the "assorted bottomfish" category. Moreover, for some species that are correctly listed by the buyer to species, they are input into the database under the "assorted bottomfish" category and therefore cannot be tracked specifically. *Pristipomoides auricilla* (yellowtail kalikali) is an example of this problem. Second, some bottomfish MUS are only listed as part of a general category. For example, *Caranx ignobilis* (giant trevally) and *C. lugubris* (black jack) are both lumped in the category "jacks," potentially with other carangids such as *Carangoides orthogrammus* (yellow-spotted trevally), *Caranx melampygus* (bluefin trevally) and *C. sexfasciatus* (bigeye trevally). Third, *Aprion virescens* (jobfish, highway, or uku) is listed on the sales invoice, but the data analysis software does not include this species in the bottomfish report. This likely means that jobfish have never been included in the bottomfish report for the last 18 years.

The CNMI's bottom fishery still consists primarily of small-scale local boats engaged in commercial and subsistence fishing, but in recent years larger vessels (35–60 ft) have entered the fishery. The bottom-fishery is broken down into two categories; deep (>500 ft) and shallow (100–500 ft) water fishing. The deep-water fishery is primarily commercial, targeting snappers and groupers. The snappers targeted include the Eteline and *Pristipomoides* complexes, whereas the eight-banded grouper (*Epinephelus octofasciatus*) is the only

targeted grouper. The shallow-water fishery, which targets the redgill emperor (*Lethrinus rubrioperculatus*), is mostly commercial but also includes subsistence fishermen. Hand lines, home-fabricated hand reels and electric reels are the common gear used for small-scale fishing operations, whereas electric reels and hydraulics are the common gear used for the larger operations in this fishery. Historically, some trips have lasted for more than a day, but currently, effort is defined and calculated on a daily trip basis. Fishing trips are generally restricted to daylight hours, with all vessels returning before or soon after sunset, unless fishing in the Northern Islands. In terms of participation, the bottomfish fleet consists primarily of vessels less than 24 ft in length that are usually limited to a 30-mi radius from Saipan. The larger commercial vessels that are able to fish extended trips and which focus their effort from Esmeralda Bank to Zealandia Bank have landed the majority of the bottomfish reported through the purchase receipt forms. In 2000, the most consistent high liner of previous years did not fish. Three other companies sold more than 500 pounds of onaga (*Etelis coruscans*), but only one of these had previously contributed at this level. Only four companies sold more than 500 pounds of emperor, and of these, one landed 47.2% of the total catch of emperor sold in 2000.

Bottom fishing requires more technical skill than pelagic trolling, including knowledge of the location of specific bathymetric features. Presently, bottom fishing can still be described as "hit or miss" for most of the smaller size (14–25 ft) vessels. Without fathometers or nautical charts, the majority of fishermen utilizing smaller vessels often rely on land features for guidance to a fishing area. This type of fishing is inefficient and usually results in a lower catch-per-unit-effort (CPUE) in comparison with pelagic trolling. Larger sized (25-ft and larger) vessels typically utilize Global Positioning System (GPS), fathometers and electric reels, resulting in a far more efficient operation. In addition, reef fishes are beginning to command a consistently higher price than bottomfishes. This appears to be reflected in an increased number of fishermen using small vessels focusing on reef and/or pelagic species over bottomfishes.

Recommendations

1) To request NMFS and the Council to assist DFW in adequately assessing the status of deepwater bottomfish stocks in the southern islands of the CNMI.

2) Establish a baseline (virgin stock) estimate for CPUE the Guam/Northern Marianas deep-water bottomfish complex (e.g., survey on grouper, snapper) utilizing data collected from the current fishery in the Northern Islands.

3) Establish baseline (virgin stock) estimate of CPUE for the Guam/Northern Marianas shallow-water bottomfish complex (e.g., redgill emperor) by sampling program aboard DFW research vessel to help calculate SPR, with assistance from NMFS.

4) With assistance from NMFS/WPacFIN, software should be developed and implemented to separate fishery statistics for the main islands fishery and from the Northern Islands fishery with separate descriptions and statistics reported in the annual report module.

5) With assistance from NMFS/WPacFIN, determine the age structure of redgill emperor populations in the southern islands of the CNMI.

Table 1.—CNMI Consumer Price Indices (CPIs).

Year	CPI	CPI Adjustment Factor
1983	140.90	1.94
1984	153.20	1.78
1985	159.30	1.72
1986	163.50	1.67
1987	170.70	1.60
1988	179.60	1.52
1989	190.20	1.44
1990	199.30	1.37
1991	215.00	1.27
1992	232.90	1.17
1993	243.17	1.12
1994	250.00	1.09
1995	254.47	1.07
1996	261.98	1.04
1997	265.00	1.03
1998	264.20	1.03
1999	267.80	1.02
2000	**273.20**	**1.00**

Calculation: The Commonwealth of the Northern Mariana Islands' Consumer Price Index is computed by the CNMI Department of Commerce using the Laspeyres' formula.

Table 2.—CNMI 2000 commercial landings of bottomfish species

Species	Landings (lb)	Revenue ($)	Average Price ($/lb)
Assorted Bottomfish	10,761	28,552	2.65
Lehi	2,091	6,305	3.01
Onaga	8,127	27,306	3.36
Ehu	36	103	2.85
Gindai	172	457	2.66
Opakapaka	1,307	3,772	2.89
Jacks	1,713	4,507	2.63
Amberjack	22	66	3.00
Grouper	2,780	6,500	2.34
Emperor (Mafute')	8,978	25,361	2.82
Sickle Pomfret	357	549	1.54
Subtotal	**36,343**	**103,477**	**2.85**
Jobfish	152	351	2.37
Total	**36,495**	**103,828**	**2.68**

Calculation: Annual summaries for each species from invoice data sheets.

Interpretation: The weight of fishes categorized as "assorted bottomfish" increased from 12.6% of the catch in 1999 to 29.6% of the catch in 2000. This may reflect an increased catch of BMUS species such as *Lutjanus kasmira, Pristipomoides sieboldii,* and/or *P. auricilla,* or a variety of other species also caught while bottom fishing such as *Lutjanus bohar, Variola albimarginata, Saloptia powelli, Etelis radiosus,* and others. A less likely alternative is that the buyers are reporting their sales in less detail. This is considered less likely because fewer of the fishermen were not identified on sales receipts (down to 0.81% of the receipts in 2000 from 1.18% of the receipts in 1999); this seems to be indicative of a greater attention to detail and increased encouragement by DFW staff of the buyers to maintain and report in as much detail as possible.

Only 3 categories of bottomfish showed increased landings in 2000. Jacks (carangids, including BMUS species *Caranx ignobilis* and *C. lugubris*) increased 6.1% from 1999. Landings of sickle pomfret (*Taratichthys steindachneri*) increased 91.9% from 1999, while emperors (lethrinids, including mafute') increased 33.7%. Landings of ehu (*Etelis carbunculus*) decreased 94.5% from 1999. This likely is a result of both decreased landings and the inherent problems with the reporting (given that buyers need to specifically add a line for this species) that are likely to inflate the assorted bottomfish category and result in greater year-to-year variation in reporting. Amberjack (*Seriola dumerili*) decreased 92.0% from 1999, and similarly, this decrease is likely a combination of both decreased landings and inherent problems with the reporting. Gindai (*Pristipomoides zonatus,* likely confounded with some *P. argyrogrammicus*) decreased 94.2% from 1999. Lehi (*Aphareus rutilans*) landings decreased 73.8% from 1999. Landings of onaga (*Etelis coruscans*) decreased 41.5% from 1999, whereas groupers (*Epinephelus fasciatus, Variola louti,* and a wide variety of

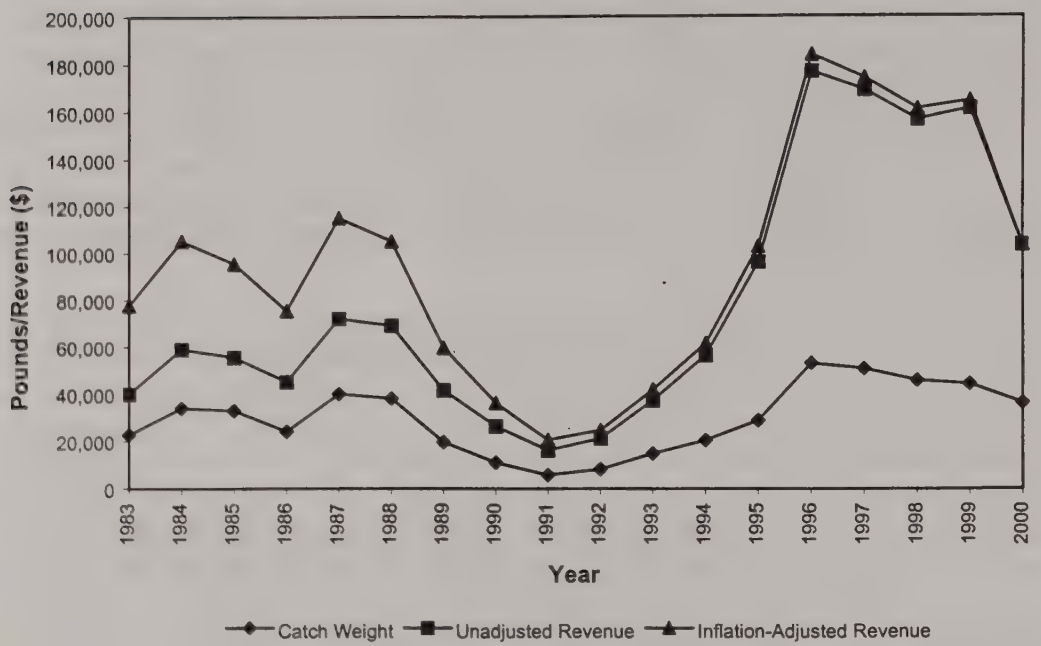
other species including *E. octofasciatus*) decreased only 10.9% from 1999. Landings of opakapaka (*Pristipomoides filamentosus,* likely confounded with some *P. flavipinnis*) decreased the least from 1999, only 7.8%. Sixty-one percent of the fishermen reporting commercial sales of bottomfishes over the last 4 years have only done so in a single year. Only 7 fishermen have bottomfish sales in all 4 years. Moreover, the high liners for each of the past 4 years have also shown this high rate of turnover. During the same period (1997 to 2000), the number of fishermen selling both pelagic fishes and bottom fishes decreased from 11.5 to 3.0%, the number selling both pelagic and reef fishes increased from 4.8 to 9.9%, and the number selling only reef fishes increased from 10.3 to 36.2%. This high rate of turnover, coupled with an increased focus on the commercial catch of reef fishes likely explains a large portion of this change.

In 2000, commercial landings of emperors (lethrinids, including BMUS species *Lethrinus rubrioperculatus* and a variety of other species including *Gnathodentex aurolineatus, Lethrinus olivaceus, L. xanthochilus,* and others) increased 33.7% over last year, but are still much lower than the peak years 1996–1998 (up to a maximum of 20,355 pounds). The amount landed in 2000 would have been much lower, if a single vessel had not entered the fishery and contributed 47.2% of the year's catch. Only 3 other vessels sold more than 500 pounds of emperor in 2000. The number of vessels selling emperor has remained at 32 vessels for the last 3 years. This species continued to be a seasonal favorite of smaller (25–30 foot) vessels harvesting around the islands of Farallon de Medinilla, Saipan, and Tinian.

Jobfish (*Aprion virescens*) landings are reported here for the first time.

Revenues and prices fell dramatically in 2000, to the lowest average price per pound (adjusted) in 7 years. The mean price per pound for bottomfishes dropped 78¢. Only 2 years in the last 18 have lower values. Prices fell for all groups (from 8¢ to $1.25 per pound) from last year, with the exception of emperor (mafute'), which increased by 14¢. Onaga still command the best prices, followed by lehi (silvermouth) and amberjack, but the range is narrowing. Demand for bottomfishes does not appear to have lessened from past years among the general public. Although general economic principles would predict that smaller catches should result in higher prices (if demand is constant), it is possible that the continued decrease in tourism has partially affected sales. Most fishes are sold as whole fish (and very few as filets or steaks). These larger species are often purchased by the hotel restaurants, which are now seeing far fewer customers. In addition, it is possible that the local public show greater demand for reef fishes. This may be reflected in the high price commanded by reef fishes such as parrotfishes and rabbitfishes.

Figure 1. 2000 CNMI commercial bottomfish landings and revenue.



Calculation: Landings in pounds are from a simple database summation of reported purchases of all bottomfish species combined. Revenue in dollars is from the same type of data base summation of the value field. The inflation adjustment is made using the Consumer Price Index (CPI) and establishing the 1999 CPI figure as the basis by which calculations of previous years' prices are made.

Interpretation: Landings, revenues, and adjusted revenues for 2000 are much less than in 1999. Landings of bottomfish were 18.2% less in 2000 than in 1999, which was 3.1% less than 1998. Although bottomfish landings in 2000 were higher than the 18-year mean, they are considerably lower than the peak values from 1996–1997. It appears that bottom-fishing activity in the CNMI has declined over the last 4 years. The causes of this decline are unknown, but two factors certainly contributed. These are changes in the high liners participating in the fishery and an increased number of local fishermen focusing on reef fishes in preference to bottomfishes.

The number of fishermen selling onaga (as representative of the deepwater bottomfish complex) has remained relatively constant for the past 4 years (10 14, 13, and 15, respectively). In each of those years, 2 or 3 fishermen have landed more than 1000 pounds (3 or 4 have landed more than 500 pounds), but no one was a high liner every year and only one sold more than 1000 pounds in 3 of the 4 years. This fisherman did not fish in 2000. In addition, 63% of the fishermen only sold onaga in 1 of the 4 years. Vessels capable of landing

large amounts of onaga almost always are larger vessels fishing the Northern Islands. The difficulty of maintaining the equipment, vessel, and crew to consistently and routinely make these trips successful appears to be difficult in the long term for fishermen in the CNMI.

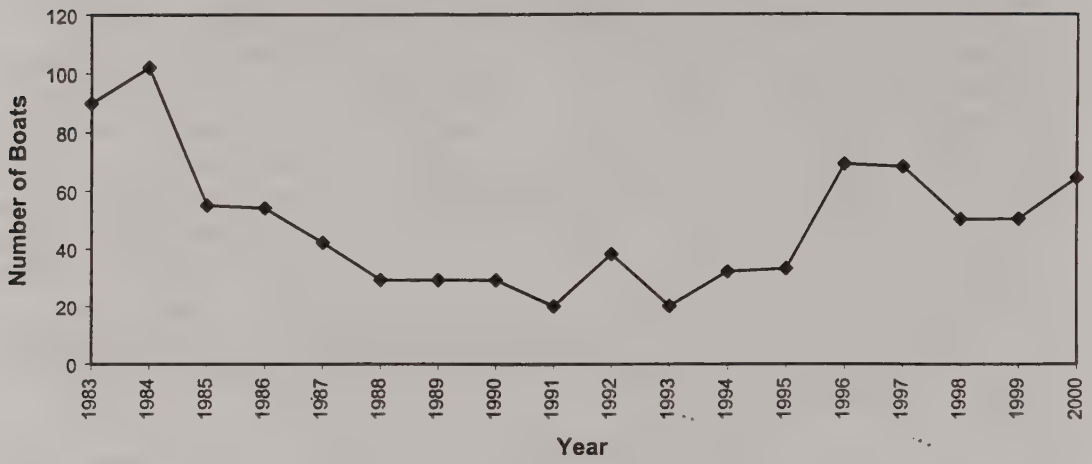
The number of fishermen selling mafute' (as representative of the shallow-water bottomfish complex) has remained at 32 for the past 3 years. In each of these years, 1 to 4 fishermen have landed more than 1000 pounds (4 to 6 have landed more than 500 pounds), but no one has been a high liner every year and only one has sold more than 1000 pounds in 2 of the 4 years. This fisherman did not fish in 2000. Like the onaga fishermen, 68.6% of the fishermen only sold mafute' in 1 of the 4 years. In 2000, the number of pounds of mafute' landed would have been much smaller, if it were not for the entry of a new (and very successful) fisherman into the market. Many of the fishermen catching mafute' do so locally, but appear to be increasing their focus on reef fishes. The bottomfishes are a smaller portion of their sales and seem to be co-lateral catch (i.e., if caught in sufficient numbers while focusing on other species, then they too will be sold).

Revenues are also much reduced (35.7% less than in 1999). Although the unadjusted revenue for 2000 is greater than the mean for the last 18 years, the inflation-adjusted value for 2000 is the lowest of the last 7 years and only 9.2% more than the mean for the last 18 years. This is a result of the combined effect of fewer pounds landed and a lower price per pound for almost all bottomfish species.

Summary Data:

Year	Pounds	Unadjusted Revenue	Inflation-adjusted Revenue
1983	22,683	40,003	77,606
1984	33,924	59,005	105,029
1985	32,780	55,396	95,281
1986	23,929	45,079	75,282
1987	39,772	71,868	114,989
1988	37,850	69,052	104,959
1989	19,550	41,379	59,586
1990	10,903	26,323	36,063
1991	5,693	16,118	20,470
1992	8,148	21,032	24,607
1993	14,769	37,310	41,787
1994	20,363	56,405	61,481
1995	28,744	96,100	102,827
1996	52,967	176,707	183,775
1997	50,851	168,890	173,957
1998	45,835	156,256	160,944
1999	44,415	161,007	164,227
2000	**36,343**	**103,477**	**103,477**
Mean	29,418	77,856	94,797
Standard Deviation	14,540	53,534	50,801

Figure 2. Number of fishermen (boats) making bottomfish landings.



Calculation: The fisherman or boats selling the catch is identified on the "trip ticket" invoices used by purchasers. The plot shows the number of unique fishermen making any landings of bottomfish within a given year.

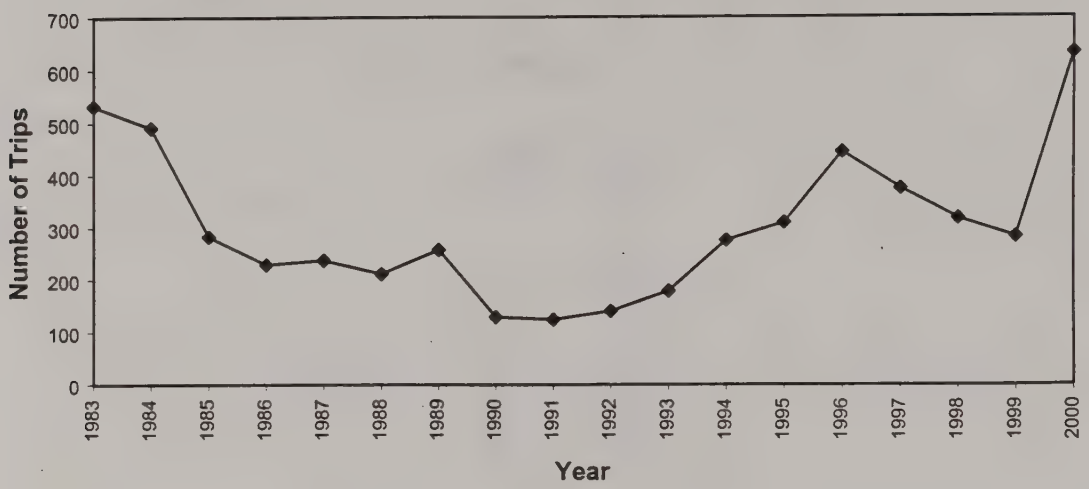
Interpretation: The number of boats or fishermen making commercial landings of any bottomfish species declined from 1985 to 1988, stabilized between 1988–1990, slightly increased during 1992, decreased again in 1993, then increased during 1994 and 1995, and increased 100% in 1996. The number of vessels making bottomfish trips dropped in 1998 and 1999 to near the 16-year average.

Note however, that almost 62.4% of the vessels selling bottomfishes in the past 4 years, only sold bottomfish in 1 of the 4 years. 19.4 to 34% of these fishermen also made a limited number of sales (2) of any type of fish in any given year. Only 6% sold bottomfishes all 4 years. This seems to be a high rate of turnover. More of the smaller vessels are focusing on reef fishes in preference to bottomfishes. During the same period (1997 to 2000), the number of fishermen selling both pelagic fishes and bottom fishes decreased from 11.5 to 3.0%, the number selling both pelagic and reef fishes increased from 4.8 to 9.9%, and the number selling only reef fishes increased from 10.3 to 36.2%.

Summary Data:

Year	Boats
1983	90
1984	102
1985	55
1986	54
1987	42
1988	29
1989	29
1990	29
1991	20
1992	38
1993	20
1994	32
1995	33
1996	69
1997	68
1998	50
1999	50
2000	**64**
Mean	49
Standard Deviation	23

Figure 3. Number of CNMI bottomfish trips.



Calculation: Adding each recorded fisherman's trip on a given day tallies the number of trips that resulted in landing any bottomfish. This assumes that each fisherman lands only once in a given day, and that all of the catch is sold on that day. Most trips last a single day, but it is also known that the occurrence of longer fishing trips is increasing.

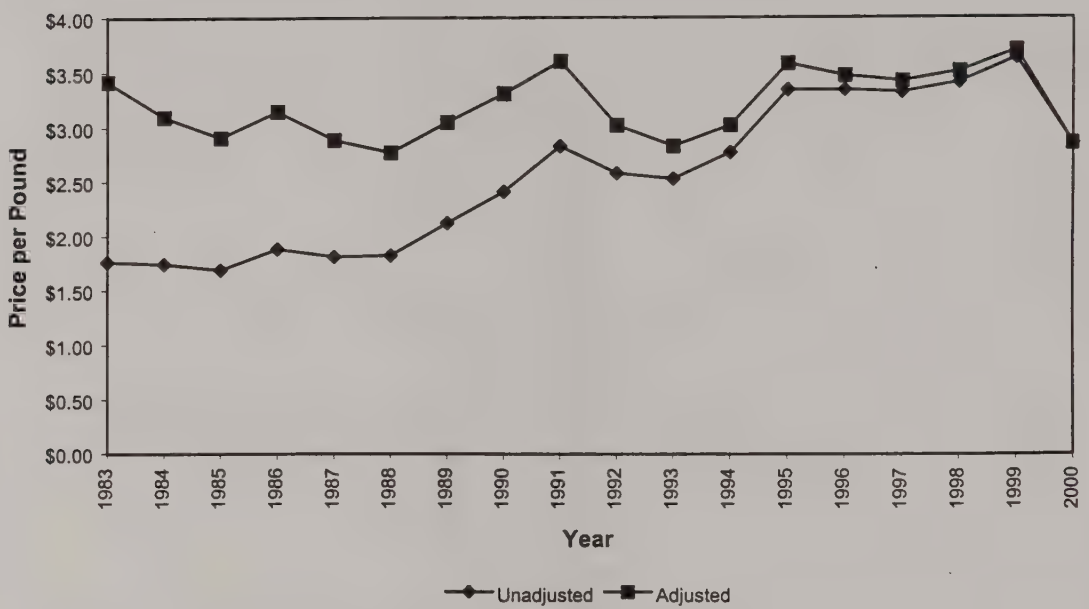
Interpretation: The number of bottomfish trips more than doubled in 2000 (compared to 1999) to reach the highest level in the past 18 years, although the number of fishermen making landings increased only slightly (Figure 2). The number of bottomfish trips was high from 1984 through 1988 as a result of consistent fishing activity in the Northern Islands, centered on the island of Farallon de Medinilla. This fishery subsequently ceased by 1990, resulting in the steep drop in bottomfish trips in the early 90s. In 1994 consistent fishing activity in the Northern Islands began once more and has continued to the present. From a high in 1996, the number of trips decreased for a few years (by 16.0% in 1997, by 15.2% in 1998, and by 10.7% in 1999).

As more of the smaller vessels increase their focus on reef fishes, bottomfishes are still being caught and sold, but they are no longer the largest (or most valuable) part of the catch. This may result in fishermen catching bottomfishes as co-lateral catch on more trips, but adding up to smaller landings. The number of fishermen selling both pelagic fishes and bottom fishes decreased from 11.5 to 3.0%, the number selling both pelagic and reef fishes increased from 4.8 to 9.9%, and the number selling only reef fishes increased from 10.3 to 36.2%.

Summary Data:

Year	Trips
1983	533
1984	492
1985	283
1986	229
1987	237
1988	211
1989	257
1990	129
1991	124
1992	140
1993	178
1994	275
1995	309
1996	445
1997	374
1998	317
1999	283
2000	**632**
Mean	303
Standard Deviation	143

Figure 4. CNMI average price of bottomfish.



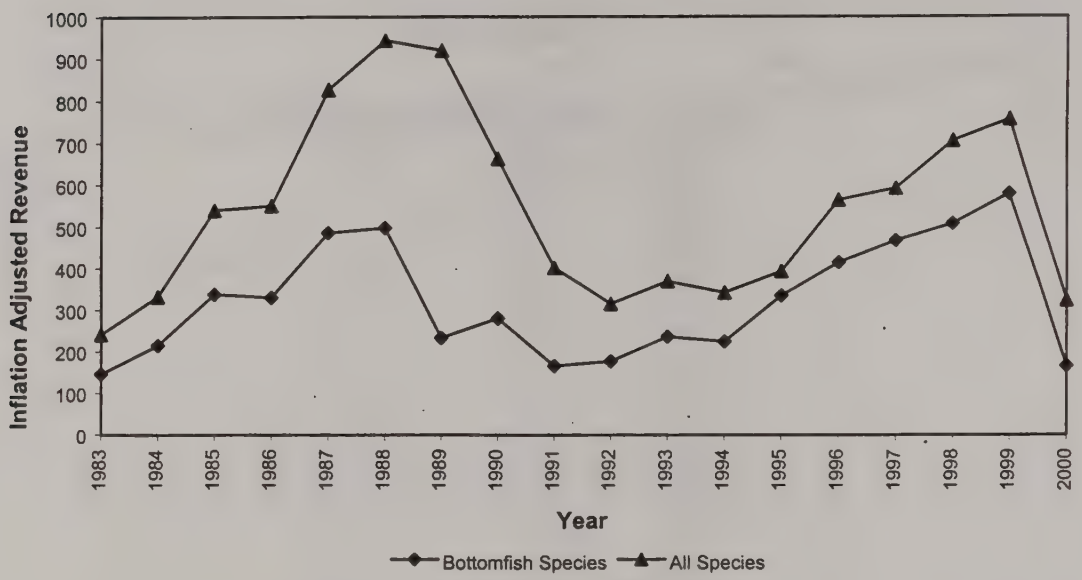
Calculation: The average price of the bottomfish complex is calculated by dividing the total revenue by the total landings. The inflation adjustment is made using the Consumer Price Index (CPI) and establishing the 1998 CPI figure as the basis by which calculations of previous years' prices are made. The CPIs for 1983–1987 were not available from the appropriate CNMI agency and were, therefore, estimated by using Guam's annual inflation rate to proportionately adjust the 1988 CNMI CPI.

Interpretation: The average price increased steadily from 1988 to 1991, where it reached what was once a record high of $2.83. In 1995, the price increased to a new record high of $3.34. This unadjusted price remained constant through 1997, increased to $3.41 in 1998, and has reached a new record high of $3.63 in 1999. The adjusted price continued to increase from 1997. Both the unadjusted and adjusted prices fell steeply in 2000. The unadjusted price was the lowest in 6 years, and the adjusted price was the lowest in 7 years. Both prices were lower than the mean for the last 18 years. The adjusted average price per pound for bottomfishes dropped 85¢. Only 2 years in the last 18 have lower values.

Summary Data:

Year	Unadjusted $/lb	Adjusted $/lb
1983	1.76	3.42
1984	1.74	3.10
1985	1.69	2.91
1986	1.88	3.15
1987	1.81	2.89
1988	1.82	2.77
1989	2.12	3.05
1990	2.41	3.31
1991	2.83	3.60
1992	2.58	3.02
1993	2.53	2.83
1994	2.77	3.02
1995	3.34	3.58
1996	3.34	3.47
1997	3.32	3.42
1998	3.41	3.51
1999	3.63	3.70
2000	**2.85**	**2.85**
Mean	2.55	3.20
Standard deviation	0.67	0.30

Figure 5. CNMI average inflation-adjusted revenue per trip landing bottomfish.



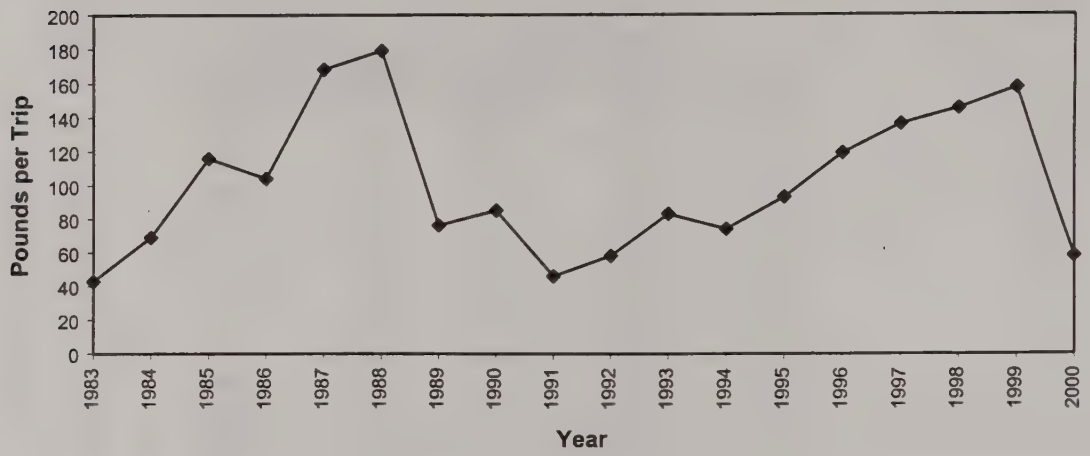
Calculation: Only trips that landed bottomfish are included in these calculations. "Bottomfish $/Trip" is the total revenue of the bottomfish sold from a trip, and "All Species $/Trip" is the total trip revenue of all other species combined (e.g., any pelagic and reef fish which were sold). The inflation adjustment is made using the Consumer Price Index (CPI) and establishing the 1998 CPI figure as the basis by which calculations of previous years' prices are made. The CPIs for 1983–1987 were not available from the appropriate CNMI agency and were, therefore, estimated by using Guam's annual inflation rate to proportionately adjust the 1988 CNMI CPI.

Interpretation: Inflation-adjusted bottomfish and the inflation-adjusted all-species revenues were both much less than in 1999. The "bottomfish species" inflation-adjusted revenue decreased to 28.3% of the 1999 revenue, a value that is just over half the 18-year mean. At the same time, the "all-species" inflation-adjusted revenue decreased to 42.6% of the 1999 revenue. The previous 5 years had all shown increases in the inflation-adjusted revenues. The bottomfish fishery has always been a small proportion of the total fisheries, and it appears that bottomfish are now a relatively lower percentage of the trip revenue on trips where bottomfish were caught.

Summary Data:

	Bottomfish Species		All Species	
Year	**Unadjusted**	**Adjusted**	**Unadjusted**	**Adjusted**
1983	75	146	124	241
1984	120	214	186	331
1985	196	337	314	540
1986	197	329	330	551
1987	303	485	517	827
1988	327	497	621	944
1989	161	232	639	920
1990	204	279	485	664
1991	130	165	316	401
1992	150	176	268	314
1993	210	235	329	368
1994	205	223	313	341
1995	311	333	366	392
1996	397	413	542	564
1997	452	466	575	592
1998	493	508	685	706
1999	569	580	741	756
2000	**164**	**164**	**322**	**322**
Mean	259	321	426	543
Standard Deviation	140	139	178	220

Figure 6. CNMI bottomfish catch in average pounds per trip.



Calculation: The average catch per trip is calculated by dividing the total weight of all bottomfish landings by the number of trips that landed bottomfish, regardless of the amount of bottomfish landed on any given trip.

Interpretation: The average pounds of bottomfish landed per trip in 2000 decreased 63.1% from 1999. This is after almost 8 continuous yearly increases in pounds landed per trip. The substantial increase since the low in 1992 can be primarily attributed to the Northern Islands fishery, coincident with the increase in vessels making bottomfish trips, increased revenues, and annual landings during that 8-year period.

Although the average catch per trip is not a very good measure of CPUE, because it is subject to significant biases (e.g., changes in trip length and relative amounts of bottom fishing compared to trolling or reef fishing); it is the only measure readily obtained from the commercial landings system. However, the smaller vessels commonly make mixed trips and the relative proportions of bottom fishes to pelagic and reef fishes seem to be changing. The number of fishermen selling both pelagic fishes and bottom fishes decreased from 11.5 to 3.0%, the number selling both pelagic and reef fishes increased from 4.8 to 9.9%, and the number selling only reef fishes increased from 10.3 to 36.2%. Given that fishermen appear to be changing the focus of their trips to include more reef fishing and less bottom fishing, this measure is an increasingly inaccurate portrayal of the actual CPUE. It has been suggested that it may be possible to improve this measure of CPUE by using only those trips that landed bottomfish exclusively. However, in the past 4 years only 2 fishermen exclusively sold bottomfishes in 1997, 1 in 1998, none in 1999 and 1 in 2000. These numbers are too low to be indicative of the entire fishery.

Summary Data:

Year	Pounds per Trip
1983	43
1984	69
1985	116
1986	104
1987	168
1988	179
1989	76
1990	85
1991	46
1992	58
1993	83
1994	74
1995	93
1996	119
1997	136
1998	145
1999	157
2000	**58**
Mean	101
Standard Deviation	42

DIVISION OF FISH & WILDLIFE
Department of Lands and Natural Resources
CNMI-Government
664-6000

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COMMERCIAL SALES DATA 92201

BUYER: _____ DATE: _____

SELLER: _____

SPECIES NAME	CODE	No. of Piece(s)	Price per Pound	Total Weight (Lbs.)	Total Value
A. Assorted Pelagic Fish	400				
1 Skipjack Tuna/Katsuo	452				
2 Yellowfin Tuna/Manguro	456				
3 Kawakawa/Saba	450				
4 White Tuna/Dogtooth	454				
5 Mahi-Mahi/Dolphin	404				
6 Wahoo/Saowara	412				
7 Rainbow Runner/Buri	410				
8 Sailfish	408				
9 Marlin	406				
10 Barracuda/Alu	402				
11 Other					
B. Assorted Reef Fish	300				
1 Goat fish/Satmoneti	322				
2 Squirrelfish/Sagamelon	312				
3 Mullet/Laiguan/Aeguas	106				
4 Rudderfish/Guili	309				
5 Rabbitfish/Hiting	304				
6 Parrot/Palagsi/Laggua	314				
7 Unicorn/Tataga	320				
8 Surgeon/Hiyok/Hugupao	318				
9 Surgeon/Hagnon	319				
10 Wrasse/Gaddas	302				
11 Other					
C. Assorted Bottom Fish	200				
1 Gindai	204				
2 Grouper/Gadao	206				
3 Onaga	210				
4 Opakapaka	212				
5 Big-eyed Scad/Atulai	102				
6 Emperor Fish/Mafuti	310				
7 Jacks/Tarakito	104				
8 Silver-Mouth/Lehi	214				
9 Jobfish/Highway	316				
10 Other					
D. Invertibrate	500				
1 Lobster/Mahongan	504				
2 Octopus/Gamsom	506				
3 Squid	508				

Appendix 5. NMFS 2000 Administrative Activities

Section 7 Consultation

NMFS, on October 16, 2000, has requested reinitiation of a Section 7 consultation (biological opinion) under the Endangered Species Act for the bottomfish FMP. In the past, biological opinions have been competed without consultation or review by the Council. The Council requested consultation before the final biological opinion is issued.

Draft Bottomfish EIS

The Council hired a contractor to prepare the Bottomfish environmental impact statement. No EIS was every prepared for the bottomfish fishery. However, NEPA review was conducted for the FMP and subsequent amendments and framework actions with either environmental assessments completed or categorical exemptions issued. A preliminary draft was presented to the Council at the 105th Council Meeting (Midway) in July 2000. Revised drafts were presented to the SSC in October 2000 and Council in November 2000. The draft document underwent two internal reviews from which comments were received from NMFS Honolulu Laboratory and Pacific Islands Area Office staff, Council Plan Team members, and Council staff. The draft included wide ranging alternatives to ensure comprehensive analysis of the impacts. The draft bottomfish EIS was transmitted to NMFS on November 2, 2000 for review and publication of the Notice of Availability in the *Federal Register*.

Use-it or Lose it Requirement for Permit Renewal (Calendar Yr 2000)

Mau Zone limited entry permits expire on December 31 each year. NMFS will renew a permit for the following year if the permit holder's vessel made a minimum of 5 separate landings, each of which consisted of at least 500 pounds of bottomfish management unit species, from the Mau Zone during the previous permit year. Failure to meet the required landing requirement may result in the permit being lost (not renewed). All 1999 Mau Zone limited entry permits were renewed, if applied for in 2000, due to the short fishing season[1].

Northwestern Hawaiian Islands (NWHI) Bottomfish Fisheries

During calendar year 2000, The Pacific Islands Area Office (PIAO) in Honolulu, issued a total of 15 permits for the NWHI bottomfish fishery. Six vessels were registered for the Ho'omalu Zone fishery; 9 vessels were registered with Mau Zone permits. During 2000, six vessels fished in the Mau zone and five vessels fished in the Ho'omalu zone.

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[1]Limited entry program started in June 1999, which provided only half a year to meet minimum landings.

Ho'omalu Zone vessels:

1. Fortuna (under new ownership)
2. Kaimi Kai
3. Kealailani
4. Laysan
5. Island Girl
6. Windwalker

Mau Zone vessels:

1. Aikane 49
2. Dasher II
3. Honua-Oe
4. Imua
5. Iwa Lani
6. Jamie Elizabeth
7. Kai Pali
8. Leo Marie
9. Wahine Kapaloa I
10. Pursuit

Appendix 6: 2000 Enforcement Activities

The following report is a combined effort of the U.S. Coast Guard 14th District and the NMFS Southwest Region Office of Enforcement. The report covers the period 1During 2000, no Coast Guard enforcement effort was focused solely on the Northwestern Hawaiian Islands (NWHI) bottomfish fishery. Boardings of opportunity on bottomfishing vessels are rare due to the remote fishing areas and scarce participants. One NWHI botomfishing vessel was boarded in 2000. The vessel was in compliance with the Western Pacific Bottomfish FMP.

The State of Hawaii requested U.S. Coast Guard assistance in monitoring compliance with bottomfish fishing regulations for the Main Hawaiian Islands. The state rules apply to all vessels taking, retaining or landing bottomfish in Hawaii, including if fishing outside of 3 nm. The rules include fishing vessel identification numbers, gear restrictions, non-commercial bag limits, and restricted areas (some outside of 3 nm).

The Coast Guard will continue to coordinate a cooperative enforcement program with State of Hawaii Department of Conservation And Resource Enforcement (DOCARE). Assistance to DOCARE will be provided: 1) in the course of normal Coast Guard operations, 2) in response to specific requests for support from DOCARE, and 3) during scheduled cooperative patrols with DOCARE officers.

Coast Guard assistance will be a balance of education and enforcement. Units shall answer the fisherman's questions regarding the MHI Bottomfish rules and the Coast Guard's role in assisting the State of Hawaii. If a bottomfish fishing (BF) vessel is boarded, we will determine if the operator is familiar with and in compliance with the applicable MHI BF rules. The USCG cannot take direct law enforcement action for a violation of this state law. If a DOCARE Officer is not embarked during a BF boarding, The Coast Guard boarding officer will document all violations and notify DOCARE.

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Appendix 8. GLOSSARY

TERM	DEFINITION
Alia	Samoan fishing catamaran, about 30 feet long, constructed of aluminum or wood with fiberglass. Used for various fisheries including trolling, longline, and bottomfishing
AP	Advisory Panel. Appointed industry/government/educational representatives functioning in an advisory capacity to the Council.
Armorhead	Groundfish found on the SE Hancock Seamount in the Northwestern Hawaiian Islands
AS or American Samoa	Includes the islands of Tutuila, Manua, Rose and Swains Atolls.
ASDPW	Department of Public Works, American Samoa. Also, DPW.
BARB	Bottomfish Advisory Review Board
BMUS	Bottomfish Management Unit Species, include deep and shallow water bottomfish species
BPT or PT	Bottomfish Plan Team. Advisory body to the Council composed of scientists and fishermen who monitor and manage the fisheries under the jurisdiction of the Bottomfish and Seamount Groundfish FMP.
Bycatch	Fish caught in a fishery but discarded or released, except in a recreational fisheries catch and release program.
Commercial	Commercial fishing, where the catch is intended to be sold, bartered, or traded.
CNMI or the Commonwealth of the Northern Mariana Islands	Also, Northern Mariana Islands, Northern Marianas, and NMI. Includes the islands of Saipan, Tinian, Rota, and many others in the Marianas Archipelago.
CPUE	Catch-Per-Unit-Effort. A standard fisheries index usually expressed as numbers of fish caught per unit of gear per unit of time, eg., number of fish per hook per line-hour or number of fish per 1,000 hooks. The term catch rate is sometimes used when data are insufficiently detailed to calculate an accurate CPUE.
DAWR	Division of Aquatic & Wildlife Resources, Territory of Guam.
DBEDT	Department of Business, Economic Development & Tourism, State of Hawaii.
DFW	Division of Fish & Wildlife, Northern Mariana Islands.

DLNR	Department of Land & Natural Resources, State of Hawaii.
DMWR	Department of Marine & Wildlife Resources, American Samoa. Also, MWR.
EEZ	Exclusive Economic Zone, refers to the sovereign waters of a nation, recognized internationally under the United Nations Convention on the Law of the Sea as extending out 200 nautical miles from shore. Within the U.S., the EEZ typically is between three and 200 nautical miles from shore.
ESA	Endangered Species Act. An Act of Congress passed in 1966 that establishes a federal program to protect species of animals whose survival is threatened by habitat destruction, overutilization, disease etc.
FAD	Fish Aggregating Device; a raft or pontoon, usually tethered, and under which, pelagic fish will concentrate.
FDCC	Fishery Data Coordinating Committee, WPRFMC.
FFA	Forum Fisheries Agency. An agency of the South Pacific Forum, which comprises the independent island states of the South Pacific, Australia and New Zealand. The FFA formed to negotiated access agreements between FFA member countries and distant water fishing nations such as Japan and the USA.
FMP	Fishery Management Plan.
GU or Guam	A U.S. territory in the Marianas Archipelago. South of and adjacent to the Commonwealth of Northern Marianas Islands.
HI or Hawaii	U.S. state. See MHI, NWHI. Composed of the islands, atolls and reefs of the Hawaiian Archipelago from Hawai'i to Kure Atoll, except Midway Islands. Capitol - Honolulu.
HDAR	Hawaii Division of Aquatic Resources. Also, DAR.
HIMB	Hawaii Institute of Marine Biology, University of Hawaii.
Hoomalu Zone	Limited entry bottomfish management area located in the northwestern Hawaiian Islands, includes area from French Frigate Shoals to Kure atoll, including Hancock seamount.
Incidental Catch	Fish caught that are retained in whole or part, though not necessarily the targeted species. Examples include monchong, opah and sharks.
Interaction	Catch of protected species, which is required to be released. Examples: Hawaiian monk seals, marine turtles and albatrosses.
Logbook	Journal kept by fishing vessels for each fishing trip; records catch data, including bycatch and incidental catch. Logbooks reported to HDAR.

Mau Zone	Limited entry bottomfish management area located north of Kauai to Necker Island at 165° W.
MFCMA	Magnuson Fishery Conservation and Management Act of 1976. Also, Magnuson-Stevens Fishery Conservation and Management Act of 1996. Sustainable Fisheries Act.
MHI	Main Hawaiian Islands (comprising the islands of Hawai'i, Mau'i, Lana'i, Moloka'i, Kaho'olawe, O'ahu, Kauai', Ni'ihau and Ka'ula).
MSY	Maximum Sustainable Yield.
NMFS	National Marine Fisheries Service, National Oceanic and Atmospheric Administration, Department of Commerce. Also NOAA Fisheries.
NOAA	National Oceanic and Atmospheric Administration, Department of Commerce.
NWHI	Northwestern Hawaiian Islands. All islands in the Hawaiian Archipelago, other than the Main Hawaiian Islands (MHI).
OY	Optimum Yield.
PIAO	Pacific Islands Area Office, National Marine Fisheries Service. Also, NMFS/PIAO.
Protected	Refers to species which are protected by federal legislation such as the Endangered Species Act, Marine Mammal Protection Act, and Migratory Bird Treaty Act. Examples: Black-footed and Laysan albatrosses, marine turtles, dolphins.
Recreational	Recreational fishing for sport or pleasure, where the catch is not sold, bartered or traded.
SAFE	Stock Assessment and Fishery Evaluation, NMFS.
Sanctuary	Protected area. Commercial/recreational fishing may be restricted.
Secretary	When capitalized and used in reference to fisheries within the U.S. EEZs, it refers to the U. S. Secretary of Commerce.
SPC	Secretariat of the Pacific Community. A technical assistance organization comprising the independent island states of the tropical Pacific Ocean, dependant territories and the metropolitan countries of Australia, New Zealand, USA, France and Britain.
SPR	Spawning Potential Ratio. A term for a method to measure the effects of fishing pressure on a stock by expressing the spawning potential of the fished biomass as a percentage of the unfished virgin spawning biomass. Stocks are deemed to be overfished when the SPR<20%.
SSC	Scientific & Statistical Committee, an advisory body to the Council

Trolling	Fishing by towing lines with lures or live-bait from a moving vessel.
USCG	U.S. Coast Guard, 14th District, Department of Transportation.
USFWS	U.S. Fish & Wildlife Service, Department of Interior. Also, FWS.
VMS	Vessel Monitoring System. A satellite based system for locating and tracking fishing vessels. Fishing vessels carry a transponder which can be located by overhead satellites. Two-way communication is also possible via most VMS systems.
WPacFIN	Western Pacific Fishery Information Network, NMFS.
WPRFMC	Also, the Council. Western Pacific Regional Fishery Management Council. One of eight nationwide fishery management bodies created by the Magnuson Fisheries Conservation and Management Act pf 1976 to develop and manage domestic fisheries in the U.S. EEZ. Composed of American Samoa, Guam, Hawaii, and Commonwealth of Northern Mariana Islands.

NPA: The Lighthouse for the Blind in New Orleans, New Orleans, LA.
ContractActivity: Office Supplies & Paper Products Commodity Center, New York, NY.

Services

ServiceType/Location: Janitorial/Custodial, FBI Information Technology Center, Fort Monmouth, NJ.
NPA: Monmouth Center for Vocational Rehabilitation, Eatontown, NJ.
ContractActivity: FBI Information Technology Center, Fort Monmouth, NJ.
ServiceType/Location: Janitorial/Custodial, Naval and Marine Corps Reserve Center, Mobile, AL.
NPA: GWI Services, Inc., Mobile, AL.
ContractActivity: Naval Facilities Engineering Command, North Charleston, SC.

SherylD.Kennerly,

Director,InformationManagement.

[FR Doc. 02–8277 Filed 4–4–02; 8:45 am]

BILLING CODE 6353– 01–P

CHEMICALSAFETYANDHAZARD INVESTIGATIONBOARD

SunshineActMeeting

The United States Chemical Safety and Hazard Investigation Board announces that it will convene a Public Meeting beginning at 10 a.m. local time on April 17, 2002, at 2175 K Street, Suite 400 Conference Room. Topics will include:

1. Update on reactive chemical hazard investigation
2. Update on CSB investigation into a fatal explosion at the BP Amoco Polymers plant in Augusta, Georgia on March 13, 2001, that killed three workers
3. Close out of CSB recommendations
4. Update on CSB budget proposal for FY 2003
5. Update on Fiscal Audit of CSB
6. Review of CSB performance goals for FY 2002
7. Update on Chief Operating Officer position filling process
8. Review of CSB management initiatives and recommendations made by CSB's Office of Inspector General
   - Request for opinion from Department of Justice regarding designation of Acting Chairperson
   - Publication of proposed rule implementing Sunshine Act
   - Discussion of proposal to Office of Personnel and Management regarding Schedule A hiring initiatives
   - Interim Outreach Proposal
9. Tentative date for next Board Meeting

The meeting will be open to the public. Please notify CSB if a translator or interpreter is needed, 10 business days prior to the public meeting. For more information, please contact the Chemical Safety and Hazard Investigation Board's Office of Congressional and Public Affairs, (202)–261–7600, or visit our website at: *www.csb.gov.*

ChristopherW.Warner,

GeneralCounsel.

[FR Doc. 02–8438 Filed 4–3–02; 2:12 pm]

BILLING CODE 6350 –01–P

DEPARTMENTOFCOMMERCE

NationalOceanicandAtmospheric Administration

[I.D.032602B]

ReceiptofanApplicationforan IncidentalTakePermit(1357)

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice of availability.

SUMMARY: NMFS has received an application for an incidental take permit from the State of Hawaii's Department of Land and Natural Resources (DLNR), Division of Aquatic Resources (DAR) pursuant to the Endangered Species Act of 1973, as amended (ESA). As required by the ESA, the DAR's application includes a conservation plan designed to minimize and mitigate any such take of endangered or threatened species. The permit application is for the incidental take of ESA-listed sea turtles associated with otherwise lawful fisheries occurring in state waters (shoreline to the extent of state jurisdiction), which are under the State's management authority (except for federal pelagic and bottomfish fisheries managed by the Western Pacific Regional Fishery Management Council). The duration of the proposed permit is July 1, 2002 to June 30, 2005. NMFS is furnishing this notice in order to allow other agencies and the public an opportunity to review and comment on this document. All comments received will become part of the public record and will be available for review pursuant to the ESA.

DATES: Written comments from interested parties on the permit application and conservation plan must be received (see **ADDRESSES**) no later than 5 p.m. Eastern daylight time on May 6, 2002.

ADDRESSES: Written comments on this action should be addressed to the Chief, Endangered Species Division, Office of Protected Resources, NMFS, 1315 East-West Highway, Silver Spring, MD 20910. Comments may also be sent via fax to 301-713-0376. The application is available for download and review at http://www.nmfs.noaa.gov/prot_res/PR3/Permits/ESAPermit.html. Comments will not be accepted if submitted via e-mail or the Internet.

FOR FURTHER INFORMATION CONTACT: Margaret Akamine Dupree (ph.808–973–2935, fax 808–973–2941, e-mail Margaret.Dupree@noaa.gov) or Therese Conant (ph. 301–713–1401, fax 301–713–0376, e-mail Therese.Conant@noaa.gov). Comments received will also be available for public inspection, by appointment, during normal business hours by calling 301–713–1401.

SUPPLEMENTARY INFORMATION: Section 9 of the ESA and Federal regulations prohibit the "taking" of a species listed as endangered or threatened. The term "take" is defined under the ESA to mean harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. NMFS may issue permits, under certain conditions, to take listed species incidental to, and not the purpose of, otherwise lawful activities. NMFS regulations governing permits for threatened and endangered species are promulgated at 50 CFR 222.307.

SpeciesCoveredinthisNotice

The following species are included in the plan and permit application: Loggerhead (*Carettacaretta*), green (*Cheloniamydas*), leatherback (*Dermochelyscoriacea*), hawksbill (*Eretmochelysimbricata*), and olive ridley (*Lepidochelysolivacea*) sea turtles.

Background

On March 21, 2002, the DAR submitted an application to NMFS for an ESA section 10(a)(1)(B) permit for an incidental take of ESA-listed sea turtles associated with state-managed fisheries. The application request is for the three year period from July 1, 2002 to June 30, 2005. This permit would allow for the continued take of sea turtles incidental to the recreational and commercial harvest of fish in state waters of Hawaii and provide conservation for sea turtles.

ConservationPlan

The conservation plan prepared by the DAR and included in the application describes measures designed to monitor, minimize, and mitigate the incidental takes of ESA-listed sea turtles in what it refers to as the "inshore fisheries."

Inshore fisheries occur in Hawaii state waters (shoreline to the extent of state jurisdiction) which are under the State's management authority (except for federal pelagic and bottomfish fisheries managed by the Western Pacific Regional Fishery Management Council). This includes both recreational fishing and commercial fishing. Many different kinds of fishing methods exist and, in aggregate, fishing occurs throughout the year and along all accessible coastlines. Hawaiian fishermen utilize gear in four broad categories: hook-and-line, net, trap and spear. There is a diverse array of gear and gear configurations within these categories.

The DAR conservation plan includes a monitoring program to accurately estimate the annual take of sea turtles by inshore fisheries and to assess the effect of mitigation measures on addressing goals and objectives. The plan would also work to reduce the lethal take of sea turtles (all species combined) by 25 percent from 2002 levels and reduce the total take by 10 percent. Incidental mortalities of ESA-listed sea turtles associated with the Hawaii inshore marine fisheries are requested at levels specified in the permit application. The plan would protect critical inshore foraging and resting habitat from the impacts of the permitted activity.

This notice is provided pursuant to section 10(c) of the ESA and the National Environmental Policy Act (NEPA) regulations (40 CFR 1506.6). NMFS will evaluate the application, associated documents, and public comments to determine whether the application meets the requirements of the NEPA regulations and section 10(a) of the ESA. If it is determined that the requirements are met, a permit will be issued for incidental takes of ESA-listed sea turtles under the jurisdiction of NMFS. The final NEPA and permit determinations will not be completed until after the end of the 30–day comment period and will fully consider all public comments received during the comment period. NMFS will publish a record of its final action in the **Federal Register**.

Dated: April 1, 2002.

PhilWilliams,

Chief,EndangeredSpeciesDivision,Office ofProtectedResources,NationalMarine FisheriesService.

[FR Doc. 02–8190 Filed 4–4–02; 8:45 am]

BILLING CODE 3510– 22–S

DEPARTMENTOFCOMMERCE

NationalOceanicandAtmospheric Administration

[I.D.040102A]

NewEnglandFisheryManagement Council;PublicMeetings

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice of public meeting.

SUMMARY: The New England Fishery Management Council (Council) is scheduling a public meeting of its Groundfish Oversight Committee in April 2002, to consider actions affecting New England fisheries in the exclusive economic zone. Recommendations from this group will be brought to the full Council for formal consideration and action, if appropriate.

DATES: The meeting will be held on April 23 and 24, 2002. See **SUPPLEMENTARY INFORMATION** for specific dates and times.

ADDRESSES: The meeting will be held in Peabody, MA. See **SUPPLEMENTARY INFORMATION** for specific locations.

FOR FURTHER INFORMATION CONTACT: Paul J. Howard, Executive Director, New England Fishery Management Council (978) 465–0492. Requests for special accommodations should be addressed to the New England Fishery Management Council, 50 Water Street, Mill 2, Newburyport, MA 01950; telephone: (978) 465–0492.

SUPPLEMENTARY INFORMATION:

MeetingAgenda

Tuesday, April 23, 2002, at 9:30 a.m. and Wednesday, April 24, 2002, at 8:30 a.m. - Groundfish Oversight Committee Meeting.

Location: Holiday Inn, 31 Hampshire Street, Mansfield, MA 02048; telephone: (508) 339–2200.

The Committee will continue development of Amendment 13 to the Northeast Multispecies Fishery Management Plan, Amendment 13 will end overfishing and establish rebuilding schedules for overfished stocks. At a meeting on February 27, 2002, the New England Council decided to develop groundfish management measures for five broad areas and one user group: inshore Gulf of Maine, offshore Gulf of Maine, eastern Georges Bank, western Georges Bank, Southern New England/ Mid Atlantic, and recreational/charter/ party. This meeting will focus on commercial fishing for groundfish in the Eastern and Western Georges Bank areas. Measures for the Western Georges Bank area will be discussed on Tuesday, April 23, 2002, and measures for the Eastern Georges Bank area will be discussed on Wednesday, April 24, 2002. Proposed area boundaries can be obtained from the Council (see **ADDRESSES**). Interested parties will be consulted to identify management measures that will achieve specific biological, economic, and social objectives identified by the Council. Such measures may include, but are not limited to, trip or possession limits, changes to the days-at-sea program, year-round or seasonal closed areas, or gear changes. Suggestions for management measures should consider all Magnuson-Stevens Act requirements.

The Committee will consider these suggested measures and will develop a recommendation that will be reviewed by the Council at a later date. After Council approval, the measures will be analyzed and included in a draft supplemental environmental impact statement.

Although non-emergency issues not contained in this agenda may come before this group for discussion, those issues may not be the subject of formal action during this meeting. Action will be restricted to those issues specifically listed in this notice and any issues arising after publication of this notice that require emergency action under section 305(c) of the Magnuson-Stevens Act, provided the public has been notified of the Council's intent to take final action to address the emergency.

SpecialAccommodations

These meetings are physically accessible to people with disabilities. Requests for sign language interpretation or other auxiliary aids should be directed to Paul J. Howard (see **ADDRESSES**) at least 5 days prior to the meeting dates.

Dated: April 1, 2002.

RichardW.Surdi,

ActingDirector,OfficeofSustainable Fisheries,NationalMarineFisheriesService.

[FR Doc. 02–8191 Filed 4–4–02; 8:45 am]

BILLING CODE 3510 –22–S

DEPARTMENTOFCOMMERCE

NationalOceanicandAtmospheric Administration

[I.D.040202A]

NewEnglandFisheryManagement Council;PublicMeeting

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and

PART73— TELEVISIONBROADCAST SERVICES

1. The authority citation for part 73 continues to read as follows:

Authority: 47 U.S.C. 154, 303, 334 and 336.

§73.622 [Amended]

2. Section 73.622(b), the Table of Digital Television Allotments under Texas is amended by removing DTV channel *22 and adding DTV channel *38 at Odessa.

Federal Communications Commission.

BarbaraA.Kreisman,

Chief,VideoDivision,MediaBureau.

[FR Doc. 02–11609 Filed 5–8–02; 8:45 am]

BILLING CODE 6712– 01–U

DEPARTMENTOFCOMMERCE

NationalOceanicandAtmospheric Administration

50CFRParts222and223

[I.D.042402B]

SeaTurtleConservation;Activities RelatedtoFishing

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice of intent to prepare an Environmental Impact Statement (EIS); request for written comments; extension of comment period on application for Incidental Take Permit (ITP).

SUMMARY: The National Marine Fisheries Service (NMFS) announces its intent to prepare an EIS to assess the potential impacts on the human environment of sea turtle interactions with fishing activities in Hawaii State waters associated with an application for an individual ITP submitted by the State of Hawaii Department of Land and Natural Resources. NMFS is responsible for analyzing these permit applications and authorizing those which meet legal requirements. NMFS also announces the extension of the comment period on the ITP application.

DATES: Written comments on fisheries/ sea turtle interactions or other information that NMFS should consider in preparing the EIS, as well as written comments from interested parties on the permit application and conservation plan are requested and must be received no later than 5 p.m. Eastern daylight time on or before June 10, 2002.

ADDRESSES: Comments on the proposal to prepare an EIS, comments on the application for an individual ITP, and requests for copies of the application for the individual ITP should be sent to: Chief, Endangered Species Division, Office of Protected Resources, NMFS, 1315 East-West Highway, Silver Spring, MD 20910. Comments may also be sent via fax to 301–713–0376. Comments will not be accepted if submitted via e-mail or the Internet. Notice of public meetings will be announced at a later date through notice in the **Federal Register**.

FOR FURTHER INFORMATION CONTACT: Margaret Akamine Dupree (ph. 808–973–2935, fax 808–973–2941, e-mail *Margaret.Dupree@noaa.gov*) or Therese Conant (ph. 301–713–1401, fax 301–713–0376, e-mail *Therese.Conant@noaa.gov*).

SUPPLEMENTARY INFORMATION:

Background

All sea turtles that occur in U.S. waters are listed as either endangered or threatened under the Endangered Species Act (ESA). The leatherback (*Dermochelyscoriacea*) and hawksbill (*Eretmochelysimbricata*) are listed as endangered. Loggerhead (*Caretta caretta*) and green (*Cheloniamydas*) turtles are listed as threatened, except for populations of green turtles in Florida and on the Pacific coast of Mexico, which are listed as endangered. Olive ridley (*Lepidochelysolivacea*) turtles are listed as threatened, except for populations of olive ridley turtles on the Pacific coast of Mexico, which are listed as endangered.

Under the ESA and its implementing regulations, taking sea turtles—even incidentally—is prohibited, with exceptions identified in 50 CFR 223.206. Reduction of the incidental capture of sea turtles as a result of fishery operations and amelioration of the impacts of this interaction is an important aspect of sea turtle recovery efforts.

Pursuant to the ESA, the State of Hawaii has submitted an application to NMFS for an individual ITP for listed sea turtles in inshore marine fisheries in the Hawaiian islands managed by the State of Hawaii. The application for an ITP was made available to the public through an earlier **FederalRegister** notice of availability (67 FR 16367, April 5, 2002), which established a comment period on the application of April 5, 2002 to May 6, 2002. Sea turtle interactions with fishing gear associated with the Hawaii-managed fisheries are known to occur, resulting in the take of threatened and endangered sea turtles. The extent and impact that will likely result from this incidental take must be analyzed and, if appropriate, authorized through section 10 of the ESA. An ITP cannot be authorized unless the applicant submits a conservation plan, and unless it can be determined that with respect to the permit application and the related conservation plan that (1) the taking will be incidental, (2) the applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking, (3) the applicant will ensure that adequate funding for the plan will be provided, (4) the taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild, and (5) any other measures or assurances required by NMFS as being necessary or appropriate for purposes of the conservation plan will be met.

NMFS has determined that an environmental impact analysis of the incidental take of sea turtles which would be authorized by the issuance of an ITP for the marine inshore fisheries managed by the State of Hawaii is necessary under the National Environmental Policy Act (NEPA). Based on comments received through this notification, NMFS intends to schedule scoping meetings at a later date that would support preparation of an EIS.

NMFS is seeking input from fishermen, sea turtle experts, non-governmental organizations (NGOs), academia, state representatives, and the public on the Hawaii fisheries and is requesting information on fisheries interactions with sea turtles as well as the identification of missing data. The purpose of this notice is to: (1) inform the interested public of the intent to prepare this EIS, (2) request public participation and comments, and (3) extend the comment period on the application for the ITP to allow more time for comment on it. If authorization of an ITP is appropriate, it will proceed in accordance with the provisions specified in the ESA.

Dated: May 6, 2002.

WandaCain,

ActingDirector,OfficeofProtectedResources, NationalMarineFisheriesService.

[FR Doc. 02–11636 Filed 5–8–02; 8:45 am]

BILLING CODE 3510 –22–S